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OF THE

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1910–1915.

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MINUTES OF THE PROCEEDINGS

OF THE

METEOROLOGICAL COMMITTEE.

1910–1911.

THIRTIETH MEETING.

63, *Victoria Street, London, S.W., 4th May*, 1910.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

CAPTAIN HARVEY. | MR. MIDDLETON.

DR. SCHUSTER.

246. The Minutes (239–245) of the Twenty-ninth Meeting (2nd March, 1910) were read and confirmed.

The regulations for the office of Superintendent of the Forecast Branch were approved as amended. (Minute 240.)

247. *Reconstitution of the Committee* (Minute 1).—Read—the following Treasury Minute, forwarded by Sir G. H. Murray with a covering letter (M.O. 1,069), dated 6th April, 1910 :—

TREASURY MINUTE, DATED 31ST MARCH, 1910.

My Lords read again their Minute of the 20th May, 1905, respecting the constitution of the Meteorological Committee for the term of five years ending on the 31st March, 1910. They propose that it be reconstituted from the 1st April, 1910, for a further term of five years in the same manner and with the same powers as in the term just expired, and that the Director be re-appointed for the same term at the same salary and with the same powers and responsibilities as heretofore.

My Lords are pleased to appoint the following gentlemen to be members of the Committee :—

Mr. W. N. Shaw, Sc.D., F.R.S., Director and Chairman.
Rear-Admiral H. E. Purey Cust, R.N., Hydrographer of the Navy.
Captain J. M. Harvey, Principal Examiner of Masters and Mates, Board of Trade.
Mr. T. H. Middleton, Assistant Secretary, Board of Agriculture and Fisheries.
Professor Sir George H. Darwin, K.C.B., F.R.S.
Professor Arthur Schuster, F.R.S.
Mr. G. L. Barstow, Treasury.

The term of appointment of Rear-Admiral Purey Cust and of Mr. Middleton will, subject to the discretion of the Admiralty and the Board of Agriculture and Fisheries respectively, expire five years from the dates of their respective appointments to the Committee, viz., 3rd September, 1909, and 3rd December, 1906, but they will be eligible for re-appointment in the usual manner.

248. *Observatories* (Minute 240).—Read—the following letter (M.O. 1,175) :—

Burlington House,
London,
April 14th, 1910.

SIR,

ADVERTING to your letter of the 3rd ultimo and previous correspondence with regard to the transfer of the work of Kew and Eskdalemuir Observatories to the Meteorological Office, I have to inform you that the President and Council of the Royal Society at their last meeting appointed the

(16363—24.) Wt 129—7249. 25. 11/10. D & S.

Gassiot Committee, to act under the scheme adopted in December last for the co-operation of the Royal Society and the Meteorological Committee in the matter under reference. The Committee is constituted as follows:—Dr. C. Chree, Sir George Darwin, Mr. W. H. Dines, Dr. R. T. Glazebrook, Capt. H. G. Lyons, Prof. J. H. Poynting, Sir Arthur Rücker, Prof. A. Schuster, Dr. W. N. Shaw, Mr. C. T. R. Wilson, and Mr. G. W. Walker, together with the Officers of the Society.

The newly constituted Gassiot Committee met yesterday and proceeded, in accordance with the scheme, to nominate Superintendents of the two Observatories above-mentioned, and an Assistant Director of Observatories, as follows:—Superintendent of Kew Observatory, Dr. C. Chree, F.R.S.; Superintendent of Eskdalemuir Observatory, Mr. G. W. Walker; and as Assistant Director of Observatories, Dr. Chree, Superintendent of Kew Observatory. The Committee propose that the appointment of the two Superintendents should be upon the same terms, *mutatis mutandis*, as those upon which their present positions under the National Physical Laboratory are held.

The Committee passed a resolution requesting the President and Council to pay over the income of the Gassiot Fund to the Meteorological Committee, as from July 1st next, the date when the scheme comes into operation.

The question of the units employed in the international publication of Meteorological observations was discussed, and it was unanimously resolved:—

(1.) That in the opinion of the Gassiot Committee of the Royal Society it is essential that all meteorological returns compiled for international use should be expressed in terms of an international system of units founded on the metric system.

(2.) That a system in which the measure of barometric pressure is expressed in megadynes per square centimetre, and of temperature in absolute degrees centigrade, would be a satisfactory one.

The Committee passed a resolution that it is desirable to complete the equipment of Eskdalemuir Observatory as a first order meteorological station. Other questions relating to the work to be carried on in future at the two Observatories were referred to Sub-Committees, to consider and report to a future meeting of the Gassiot Committee.

I am, &c.,
J. LARMOR,
Secretary, R.S.

The Director,
The Meteorological Office.

Reported—memoranda and correspondence of the Director of the National Physical Laboratory (M.O. 1,184) as follows:—

i. Minutes and notices relative to the staff at Kew.

(*a.*) FROM MINUTES OF KEW COMMITTEE.

EXTRACT from Information to Applicants for the post of Superintendent, March 1st, 1893.

The Superintendent is the chief executive officer of the Kew Committee, to whom he is responsible for the due administration of the Observatory, for the disbursement of its funds, and for the conduct of the experiments carried on there. His salary will be £400. No provision is made for a pension. Three months' notice on either side are required before terminating the engagement. The Superintendent is expected to reside at or near Richmond, and to devote his whole time to the Observatory.

The qualifications looked for are—knowledge of the subjects dealt with at the Observatory, experimental aptitude, business habits, administrative faculty, energy and scientific status.

Original Appointment of Dr. Chree, Minute of April 28th, 1893.

It was finally decided unanimously to appoint Mr. Charles Chree, Superintendent.

It was further resolved that the vacation of the Superintendent be six clear weeks in each year.

Commencement of Duties, Minute of May 26th, 1893.

The Chairman reported that Mr. Chree entered upon office on May 15th, and that the Bank of England, and the London and County Bank, Richmond, had been informed of his becoming Superintendent and had intimated their registration of his signature; also that the Royal Society had confirmed the election of Dr. Chree.

(*b.*) FROM MINUTES OF EXECUTIVE COMMITTEE OF NATIONAL PHYSICAL LABORATORY.

Increases of Salary, Extracts from Minute of March 13th, 1901.

Report of the Staff Committee.

The following report was presented by the Staff Committee and on the motion of Sir W. Abney, seconded by Sir E. Carbutt, it was—

Resolved:—That the report be adopted, and that it be ordered accordingly.

II.—*Salaries at Kew.*

The Committee find that during the past five years there has been an annual profit from the work at Kew, amounting to between £300 and £400; moreover, the work is now increasing.

They think that, in view of the long and valuable services of the senior members of the staff, and having regard to the very strong recommendations presented by the Kew Committee before its dissolution, some improvement should be made in the position of members of the Observatory staff at once.

They recommend—

(i.) That the maximum stipend of a senior assistant should be £200 a year.

(ii.) That the maximum stipend of a junior assistant should be £150 a year.

(iii.) That the salaries of the staff should be as in Schedule B.

(iv.) That A. C. Cooper, B. Francis, and A. G. Williams* (boy clerks) be continued in the service of the Committee, at salaries of £65 a year, with an annual rise of £5, until the Committee otherwise determine, and that the appointments be subject to one month's notice.

* * * * * * *

SCHEDULE B.

Observatory Department.

Salaries of Staff.†

Name and Designation.	Service.	Salary.
		£
Dr. Chree, Superintendent	8	550
Mr. T. W. Baker, First Assistant	41	325
Mr. E. G. Constable, Senior Assistant	28	200
Mr. J. Foster, Senior Assistant	34	200
Mr. T. Gunter, Senior Assistant	26	175
Mr. W. J. Boxall, Senior Assistant	21	160
Mr. E. Boxall, Junior Assistant	9	105
Mr. G. Badderley, Junior Assistant	7	95

Increase of Dr. Chree's Salary to £600 *with* £56 10*s.* 10*d. per annum for securing an annuity at the age of* 60 *years, Minute of April* 14*th*, 1905.

The Finance Committee reported, with reference to their consideration of the stipend and claims of Dr. Chree, (1) that they recommend that his stipend be raised by £50 per annum as from March 31st last, and (2) that an additional sum of about £50 per annum be paid to Dr. Chree to be invested by him, with the approval of the Committee, so as to secure an annuity at the age of 60 years, the receipts for these annual payments being handed to the Committee.

The Director reported that at the request of the Finance Committee he had discussed the matter with Dr. Chree, who proposed to take out a policy with the Scottish Provident Institution, according to which an annual payment of £50 would secure an annuity of £88 8*s.* 8*d.* after the age of 60 years, or the return of nine-tenths of the premium in case of death or surrender before 60.

After discussion, the recommendations of the Finance Committee and the arrangement reported by the Director were approved, and it was agreed that the annual payment to Dr. Chree for the purpose of securing an annuity be £56 10*s.* 10*d.*, that being the sum required to provide an annuity of £100.

Note.—This payment of £56 10*s.* 10*d.* is made annually to Dr. Chree during the month of May.

Minute of February 17*th*, 1905.

The following proposals, referring to the Kew establishment, were then approved :—

(1.) That the salaries of Mr. Constable and Mr. Foster be each increased by £25 per annum, making them £225, in recognition of their services as heads of their respective departments.

(2.) That the salaries of Mr. Francis, Mr. Cooper, and Mr. Williams be each increased by £15 per annum, making them £100.

These increments are to reckon from March 31st, 1905.

Minute of April 11*th*, 1906.

Assistants at Kew.

It was agreed that the scale of increments adopted at Bushy be also applied to Senior and Junior Assistants at Kew.

Senior Assistants,	£150 to £200.	Annual increment,	£10.
Junior ,,	£90 to £150.	,,	,,	£7 10*s.*
,, ,,	£60 to £90.	,,	,,	£5.

THE NATIONAL PHYSICAL LABORATORY.

REGULATIONS FOR THE ENGAGEMENT AND EXAMINATION OF BOY-CLERKS.

1. The salary of a boy-clerk commences at 10*s.* a week (paid monthly) and rises annually, by 2*s.* a week, up to a maximum of 20*s.* a week.

2. Candidates must be over 15 and under 17 years of age on appointment.

* This promoted Mr. Cooper, Mr. Francis, and Mr. Williams to the position of Junior Assistants.

† Those no longer at Kew omitted.

3. Candidates will be required to pass an elementary examination in writing, dictation, and arithmetic, at a date of which due notice will be given. Value is attached to any evidence of a more liberal education.

4. Good hearing and eyesight are essential.

5. The work of a boy-clerk is usually only partly clerical. He is expected to assist in any mechanical or photographic operations necessary in the ordinary work of the Laboratory, and to perform any other duties assigned him by the Director.

6. The selected candidate will be expected to produce a birth certificate as evidence of his age coming within the limits mentioned in paragraph 2.

7. A boy-clerk will not be retained after completing his 20th year, unless an opportunity presents itself for his appointment as a junior assistant.*

8. It is clearly to be understood that every boy-clerk is liable to be discharged at the discretion of the Director on receiving one month's notice.

R. T. GLAZEBROOK,
Director.

Office hours	9.30 a.m. to 5 p.m.
Saturdays	9.30 a.m. to 1 p.m.

ii. Memorandum by the Director of the National Physical Laboratory for a meeting of the Magnetic Observatory Committee on November 13th, 1906, setting out the programme of magnetic work at the two observatories, the staff and expenditure, and the buildings, offices, &c. required, estimating the annual expenditure at £1,170 of which it was subsequently suggested £170 might be provided by economies at Kew.

MAGNETIC OBSERVATORY SUB-COMMITTEE.

MEMORANDUM by the Director for a meeting of the Magnetic Observatory Sub-Committee on the 13th November, 1906.

1. Good progress has been made with most of the buildings, and the Clerk of the Works states that unless the winter proves very unfavourable they will be finished early in May in accordance with the contract.

It is necessary, therefore, to consider the details of the work, the staff, and the expenditure.

A report on these matters was made by the Observatory Sub-Committee to the Executive Committee in 1902 and transmitted to the Treasury. No decisions have been come to, however, and the Executive Committee would wish the matter reconsidered in case it may appear that circumstances have altered before the Treasury is again approached. The following is an extract from this Report :—

The work to be done at a Magnetic Observatory should include :—

I. (*a*) Registration of magnetic elements, measurements of the curves, and preparation of the results for publication.
(*b*) Observations on earth currents.
(*c*) Observations of atmospheric electricity.
(*d*) Seismological observations.

II. Standardization of old patterns of instruments and examination of new patterns.

The whole of I. should be undertaken at the new observatory, except the final preparation of the results for publication. Only a portion of II. need be removed from Kew.

This Section II. subdivides into :—

(*a*) Testing of dip circles. This might at present stay at Kew.
(*b*) Testing of unifilar magnetometers. The examination of the instrument, the testing of the graduations, the measurement of the inertia bar and of the deflexion bar, and various other measurements might be made at Kew. The testing of the apparatus for freedom from magnetic material would present difficulties, and, if done at Kew, might require a night observation. It might probably be necessary to send the magnets and inertia bar to the new station for observation of their constants.
(*c*) Testing of ships' compasses, and of levels and other similar apparatus. This could remain at Kew.
(*d*) Testing of recording instruments. This, if a complete test be required, might have to be done at the new station, but the work is infrequent, and in many cases the necessary examination could be done at Kew.
(*e*) Examination of new patterns of instruments. The greater part of this might be done at Kew.

Plan of Work.—Since very great difficulty would be found in transferring the test work to a position difficult of access, it is necessary to divide the work in some such manner as that indicated above. In this case the headquarters of the Superintendent would be at Kew or Bushy, where he would supervise the magnetic experimental work and probably the publications. Moreover, in view of the testing work, it would be necessary to maintain a magnetic staff at Kew.

[* Note added April 22nd, 1910. On several occasions a year's extension has been granted when it has appeared probable that a post would shortly be vacant.—C. C.]

Staff and Expenditure.—The new observatory would be organised as an observing and recording station. For this purpose the staff must consist of two trained observers and a boy. A caretaker, who should be a mechanic, and a housekeeper would also be required.

At present the magnetic observations are only reduced on the five quiet days in each month, and when wanted for special work. In order to utilise fully the undisturbed conditions of the new observatory it is essential to publish completely all the records; to do this would require at least one computer, additional to those now employed, and would involve expense in printing.

Thus the following is an approximate estimate of expenditure :—

	£
Salary of First Observer	400
Salary of Second Observer	250
Salary of Computer	100
Wages of Caretaker and Mechanic	120
Wages of Boy	50
Materials, Chemicals and apparatus	100
Heating, Lighting and Maintenance of Building	150
	£1,170

Provision for some increase in the salaries in future would also be necessary.

Buildings Required. Non-Magnetic Rooms.—I. Underground room for recording instruments, about 30 ft. by 25 ft.

II. Underground room for eye-reading variometers and experimental work, about 30 ft. by 25 ft.

III. Magnetic house for absolute measures, about 25 ft. by 20 ft.

IV. Magnetic house for experimental work, about 25 ft. by 20 ft.

These four rooms must be free from magnetic material and well removed from each other, and from the house and office part of the building. The object of having two of them underground is to secure uniformity of temperature; if it is not possible to excavate on the site, then rooms above ground with double walls and roof would be required.

The two magnetic houses, III. and IV., must be absolutely free from disturbing influences; it may be found best to build them in wood with double walls, using only copper nails in the construction.

Office and Houses.—V. Office for reducing observations, library, &c., 30 ft. by 25 ft.

VI. Photographic room, 18 ft. by 15 ft.

VII. Room for earth current apparatus and atmospheric electricity work, 30 ft. by 25 ft.

VIII. Underground room for seismograph. This would come best with the other underground rooms, 18 ft. by 15 ft.

IX. Workshop and packing room, 30 ft. by 15 ft.

X. House for Senior Assistant, say six rooms and offices, with two rooms additional for use by the Superintendent or visitors working at magnetic observations.

XI. House for Caretaker and Housekeeper (man and wife), with rooms for Junior Assistant and Computer.

Apparatus.—In estimating the capital cost of the new observatory an allowance must be made for tools and apparatus. Nearly all of that at present in use at Kew must be retained there in order to carry on the testing work, and a practically complete outfit will be required. The expense of providing telegraphic or telephonic communication will have also to be met. A small plant for producing acetylene gas or some other illuminant for the recording instruments is also necessary.

2. *The use of Magnetic Material.*—The material, a local whinstone, of which it was proposed to build the underground rooms, was submitted for test for freedom from magnetism and found satisfactory. The Director, therefore, approved its use.

At a later date a better quarry was found at some little distance from the site, and stone from this quarry was used for the outer walls of these rooms. These walls are practically complete, but nothing more has been done. This material was not submitted for test. The Director learnt of this on visiting the site recently and asked to have specimens sent for test at once. He regrets to report that the stone is very distinctly magnetic.

Dr. Chree is at present at Eskdale examining on the spot the disturbance due to the walls, and tests are being made at the Laboratory.

The Executive Committee wish for the advice of the Magnetic Committee as to the steps to be taken.

iii. Minutes of the Executive Committee referring to reserve provisions for Eskdalemuir as follows :—

ROYAL SOCIETY.

NATIONAL PHYSICAL LABORATORY.

At a Meeting of the Executive Committee of the National Physical Laboratory, held on November 16th, 1906,

Present—

LORD RAYLEIGH, P.R.S. (*Chairman*), in the Chair, followed by SIR FRANCIS HOPWOOD.

SIR WILLLIAM ABNEY, F.R.S.	MR. W. H. MAW.
COL. CROMPTON.	PROF. J. PERRY, F.R.S.
MR. R. K. GRAY.	SIR A. RÜCKER, F.R.S.
MR. R. A. HADFIELD.	DR. T. E. THORPE, F.R.S.
MR. D. HOWARD.	SIR J. WOLFE BARRY, F.R.S.
MR. A. B. KEMPE, F.R.S. (*Treas.*).	

MR. R. T. GLAZEBROOK, F.R.S. (*Director*), attended.

Eskdale Muir Observatory.

8. The Director laid before the Committee the Minutes of the Meeting of the Magnetic Observatory Committee of November 13th, 1906, from which it appeared that Dr. Chree, who had visited Eskdale Muir, had found variations of 1 in 500 in the value of the Horizontal Force within the Magnetograph House, and that the following resolution had been passed by the Committee :—

" That having heard a report from Dr. Glazebrook as to the magnetic character of the stone used in the Magnetograph Room, and having considered the observations made on the spot by Dr. Chree, the Committee are of opinion that the uncertainties arising from the presence of iron are sufficiently serious to render the buildings unsuitable for the delicate observations for which they are intended.

" The Committee, therefore, are of opinion that the stone which, contrary to their instructions, has been used without previously having been submitted for the purpose of testing, should be replaced by stone of approved quality."

The Director stated that he had reported the tenor of this resolution to Mr. Oldrieve of the Office of Works, and had received from him a letter dated November 15th, 1906, in which he wrote :—

" Thank you for kindly letting me know how the matter stands at once. I will now give immediate instructions for the removal of the magnetic whinstone and for a search to be made for non-magnetic stone."

The resolution of the Observatories Committee was adopted by the Executive Committee, and the Director instructed to acknowledge Mr. Oldrieve's letter with thanks, and to forward to him a copy of the above resolution.

The Director reported that the Observatories Committee had considered the future work, organization and staff of the Observatory, discussing, in detail, the report of 1902, in which these questions were considered, and, as the result of the discussion, had agreed to the three following resolutions :—

(1) " That the Superintendent of the Observatory Department of the National Physical Laboratory should remain in charge of the magnetic work of the two observatories."

(2) " That, subject to this proviso, the principal assistant at the Eskdale Muir Observatory should be a man of scientific standing and initiative."

(3) " That, subject to alterations in detail, an annual expenditure, previously estimated at £1,170, will be required in the first instance, and that some provision for increase in the future will have to be made."

The Executive Committee adopted the resolutions, and instructed the Director to request the Secretary of the Royal Society to bring the question of the grant for maintenance and salaries again before the Treasury, with a view to making provision in the forthcoming estimates.

At a Meeting of the Executive Committee of the National Physical Laboratory, held on February 15th, 1907,

Present—

LORD RAYLEIGH, P.R.S. (*Chairman*), in the Chair.

MR. G. T. BEILBY, F.R.S.	MR. A. B. KEMPE, F.R.S. (*Treas.*)
COL. CROMPTON.	MR. W. H. MAW.
MR. R. K. GRAY.	SIR J. WOLFE BARRY, F.R.S.
MR. D. HOWARD.	

MR. R. T. GLAZEBROOK, F.R.S. (*Director*), attended.

8. *Eskdale Muir Observatory.*—The Director reported the following correspondence between the Royal Society and H.M. Treasury :—

[COPY.]

" SIR, " *January 24th*, 1907.

" THE letter of Sir G. Murray of December 14th has been considered by the Council of the Royal Society by aid of a Report from the Director of the National Physical Laboratory, which has been placed before them by the Executive Committee of the Laboratory.

" The Council have adopted the estimates contained in this Report, transmitted herewith, showing the proposed allocation of the Annual Endowment of the National Magnetic Observatory at Eskdale Muir. It will be seen that the expenses are expected to accrue from July 1st.

" I am also directed to convey the assent of the President and Council of the Royal Society to the arrangement by which the Eskdale Muir Observatory shall be vested in the Office of Works, while the Royal Society will be responsible for internal maintenance only.

" I am, Sir,
" Your obedient Servant,
" J LARMOR,
" Secretary, R.S.

" The Secretary,
" H.M. Treasury."

[ENCLOSURE IN ABOVE.]

" Eskdale Muir : expenses of Staff and Maintenance. Notes in reply to the Treasury Letter of December 14th, 1906 : adopted by the Executive Committee.

" The magnetic work at present carried on at Kew may be classified under :—

" A. Observational and reduction work connected with the magnetic records from the Observatory itself.

" B. Other magnetic work, such as the preparation of the table of magnetic constants for other observatories as given in the Annual Report, answering enquiries as to the values of the magnetic elements at stations throughout the country, advising on magnetic matters, questions of instrumental difficulty and the like, chiefly from home and colonial enquirers, sometimes from abroad, supplying copies of magnetic curves, &c.

" C. Instructing naval officers, travellers, colonial observers, and others in the taking of magnetic observations, affording assistance for naval officers and others for comparative observations with their own instruments.

" D. Comparison and verification of magnetic instruments.

" E. Special research work, mostly connected with the past Kew records, resulting in the production of numerous papers on magnetic questions, published by the R.S. and elsewhere.

" Of this work very little beyond that included in A can be moved to Eskdale Muir, for two reasons :—

" (1) The testing of instruments, &c. (D), must be done at a place to which makers have reasonably easy access and to which carriage is not prohibitive ; and

" (2) Much of it needs the personal supervision of Dr. Chree, Superintendent of the Observatory Department, whose other duties require his presence at the Kew Observatory.

" The work in question is shared between four members of the staff, and an attempt has been made to estimate the time and cost of the same. This is given in the table :—

" *Estimate as to Cost of Magnetic Work.*

—	Stipend.	Total time on Magnetic Work.	Time on Work under A. Less than	Value of Time under A.
	£			£
Superintendent	600	4 months	1 month	50
First Assistant	325	9 „	3 months	81
Computer and Photographer	160	6 „	3 „	40
				171

" In addition to this, there will be some slight saving on photographic paper and chemicals.

" But while, no doubt, some economies can be made if the work be transferred, the whole sum mentioned cannot be saved. It is clearly impossible to think of reducing the stipends of the Superintendent and First Assistant. Indeed, in Dr. Chree's case, it is probable that the work of supervising Eskdale Muir, involving certainly an occasional visit, will take more of his time than is now given to Class A work. Mr. Baker, the First Assistant, will doubtless have more time to give to his Optical work, and the pressure on that Department, which has led to some considerable overtime there will be relieved ; the Computer's work will also be lessened : and on these two heads some reduction of expenditure will follow.

" The saving on the photographic work will be trifling : for (1) when all the photographic records from the other apparatus have to be developed, the additional cost of developing the magnetic curves is small ; and (2), the curves are required to enable the test work under D to be carried out.

" As to the other points in Sir G. H. Murray's letter, the Contractors have undertaken to complete their work on May 5th, and the Office of Works expect them to be up to time. Possibly it will suffice if the grant runs from July 1st, but it ought not to be later, if we are to get to work in the summer.

" As to the question of maintenance, the Committee have from the first in their estimates contemplated only internal maintenance, and have learned, with thanks, of the decision of the Treasury on this point.

" As to the allocation of the sum of £1,170; that stands as in the Report of November 21st, 1902, which their Lordships already have, but the Committee felt that it was difficult for them to estimate exactly the sums which would be required as additional to a normal salary to induce men to go to Eskdale Muir.

" It was at the same time pointed out that the sums for apparatus and working expenses, &c., were small, and it was thought it might be possible to make some readjustment between these items, paying rather less possibly to one of the staff, and more to the cost of working the Observatory.

" *January 18th*, 1907."

[COPY.]

" 1751/07.

" Treasury Chambers,
February 4th, 1907.

" GENTLEMEN,

" IN reply to Prof. Larmor's letter of the 24th ult., I am directed by the Lords Commissioners of His Majesty's Treasury to state that My Lords will cause a sum of £750 to be included in the Estimate for Scientific Investigations, &c., as a grant in aid of the salaries and expenses of the National Physical Laboratory for Eskdale Muir Observatory from July 1st next, the above sum to cover the cost of internal repairs and maintenance, as well as heating and lighting, for which the Royal Society will be responsible.

" I am, Gentlemen,
" Your obedient Servant,
" ROBERT CHALMERS.

" The Secretaries,
" Royal Society."

At a Meeting of the Executive Committee of the National Physical Laboratory, held on October 18th, 1907,

Present—

LORD RAYLEIGH, P.R.S. (*Chairman*), in the Chair, followed by the TREASURER.

SIR W. DE W. ABNEY, F.R.S.	MR. R. K. GRAY.
MR. G. BEILBY, F.R.S.	MR. D. HOWARD.
COL. CROMPTON.	MR. A. B. KEMPE, F.R.S. (*Treas.*).
DR. ELGAR, F.R.S.	MR. W. H. MAW.

MR. R. T. GLAZEBROOK, F.R.S. (*Director*), attended.

12. *Eskdale Muir.*—The Director reported, with reference to progress at Eskdale Muir Observatory, that the buildings were still in the contractor's hands. Further, that the question of the Staff for the Observatory remained for consideration. It would, however, be desirable to arrange as soon as possible for the appointment of a caretaker.

Discussion ensued upon these matters.

Finally, it was agreed that the question of the Staff should be referred to the Magnetic Observatory Committee for a recommendation. Also, that that Committee be informed that the Executive Committee would be prepared to favourably entertain the allocation of a sum of money, within reasonable limits, for the provision of furniture for the chief assistant's house at the Observatory.

At a Meeting of the Executive Committee of the National Physical Laboratory, held on November 15th, 1907,

Present—

LORD RAYLEIGH, P.R.S. (*Chairman*), in the Chair.

SIR W. DE W. ABNEY, F.R.S.	MR. D. HOWARD.
COL. CROMPTON.	MR. A. B. KEMPE, F.R.S. (*Treas.*).
MR. R. K. GRAY.	MR. W. H. MAW.
MR. R. A. HADFIELD.	

MR. R. T. GLAZEBROOK, F.R.S. (*Director*), attended.

4. The Director reported, with reference to the suggested application to H.M. Treasury for a further Grant-in-Aid for building and equipment of the Laboratory, and an increase in the Annual Grant (Minutes, October 18th, Nos. 6, 7) that the President of the Royal Society had approved the despatch of the following letter :—

" *November 7th*, 1907.

'SIR,

" I AM directed by the President and Council of the Royal Society to transmit for the information of the Lords Commissioners of H.M. Treasury the Memorandum on increased expenditure enclosed herewith, which has been framed by the Executive Committee of the National Physical Laboratory.

" The President and Council desire to support the applications that are contained in the Memorandum, and they consider that the Executive Committee of the Laboratory have placed their immediate requirements at the lowest figure that was possible for them. The Laboratory has now become the active agent as regards this country in a large amount of international official work of a scientific character, which, in its absence, would have to be provided for with less continuity, and probably greater expense.

" The President and Council venture to urge one consideration in addition to those put forward by the Executive Committee. It is, that in their nominations to the Executive Committee the President and Council have taken pains to secure the services of the men most qualified to direct such an institution, and that the Committee have devoted without stint both their business ability and their personal influence to the economical development of the institution of which they have had the charge.

" I am, Sir,
" Your obedient Servant,
" (Signed) J. LARMOR,
" *Secretary, R.S.*

" The Secretary, H.M. Treasury."

MEMORANDUM ON TREASURY GRANTS FOR 1908–09.

October, 1907.

Building and Equipment Grant.—In a Memorandum, dated February 19th, 1904, the Executive Committee of the National Physical Laboratory estimated that the sum of £28,700 was required for new buildings and equipment; and, in reply to this, dated December 21st, 1904, the Lords Commissioners of H.M. Treasury intimated that they were prepared to ask Parliament for an additional grant of £5,000 for 1905–06, and stated further that "they hope that for four or five years to come it may be possible to provide an equal amount."

The Executive Committee acknowledge gratefully that this hope has been fulfilled in the years 1906–07 and 1907–08, the grant in the former year being specially raised to £10,000; with the £20,000 thus received the Committee have erected buildings for Engineering, Electricity, Metallurgical Chemistry, and Metrology. The contracts for these buildings, which are now practically completed, have absorbed more than the whole of the £20,000.

During the same period, friends of the Laboratory have contributed £8,000 towards the equipment of the three buildings first named, while in addition a large amount of valuable apparatus has been presented for this purpose.

At present, payments amounting to a considerable sum are still due, for extras necessarily incurred during the course of erection of the buildings, and to meet the cost of special foundations for the machines and apparatus which are being installed.

The equipment for the Metrological Laboratory has also still in great measure to be provided.

The Committee trust that, for these two objects, and to defray the cost of necessary additions to the equipment in the other buildings, and of making some alterations in the older buildings required by the removal of some departments to their new quarters, it may be possible for Their Lordships, in accordance with the hope held out in 1904, to include a sum of £5,000 for building and equipment in the estimates for 1908-09.

Annual Expenditure.—With the growth of the buildings the annual expenditure has necessarily increased. Lighting, heating, attendance, cleaning, and other maintenance charges have to be met. The receipts from fees are increasing, but the increase is quite insufficient, after meeting the increased expenditure, to enable the Committee to utilize adequately the opportunities for research and investigation offered by the new Laboratories.

For the purposes of the National work entrusted to the Committee and in comparison with similar national institutions in other countries with which the Laboratory is brought into connection in international work, the staff is insufficient and the salaries are small.

In their Memorandum of 1904, the Committee expressed their opinion that an annual sum of £10,000 would be needed to carry out efficiently the work entrusted to them, and in view of the considerations set forth, they now ask that Their Lordships should make provision for an increase of at least £1,000 in the forthcoming estimates for 1908–09, thus raising the annual grant to £7,000 for the next financial year.

Magnetic Observatory, Eskdale Muir.—In accordance with a Treasury letter, dated February 4th, 1907, a sum of £750 has been received as a grant in aid of the expenses at Eskdale Muir for three-fourths—July 1st, 1907, to March 31st, 1908—of the financial year 1907–08.

In the estimate of expenditure put forward on December 1st, 1906, and explained in a Memorandum transmitted by the President and Council of the Royal Society, January 24th, 1907, a sum of £1,170 was arrived at as the probable necessary expenditure per annum, while it was shown that a saving of at most £170 might be anticipated from the changes at Kew.

The Committee request that in 1908–09, and until further ordered, the sum of £1,000 for the expenses of the Magnetic Observatory at Eskdale Muir, may be included in the estimates by Their Lordships.

5. With reference to the question of the staff at Eskdale Muir (Minutes, October 18th, No. 12), the Director reported that the Magnetic Observatory Committee had met, and presented as a report the Minutes of the Meeting.

The conclusions of the Committee were discussed, and finally, it was—

Agreed—That Mr. G. W. Walker, M.A., formerly Fellow of Trinity College, be appointed as Superintendent of the Eskdale Muir Observatory, in accordance with the terms of the Memorandum of October 1st, 1907, the Minutes of the Executive Committee of November 16th, 1906, and the general conditions and Minutes relating to posts in the Laboratory so far as they are applicable.

The salary attached to the post is at the rate of £400 a year, and the appointment dates from January 1st, 1908.

The Superintendent is to have six weeks' leave of absence during the year, and it is part of the conditions of his appointment, and of that of the other members of the staff, that they may from time to time be transferred to the Observatory or other Department of the Laboratory for the purpose of work.

At a Meeting of the Executive Committee of the National Physical Laboratory, held on February 21st, 1908,

Present—

LORD RAYLEIGH, P.R.S. (*Chairman*), in the Chair.

COL. CROMPTON.	MR. A. B. KEMPE, F.R.S. (*Treas.*).
MR. R. K. GRAY.	MR. W. H. MAW.
MR. R. A. HADFIELD.	DR. W. N. SHAW, F.R.S.
MR. D. HOWARD.	SIR J. WOLFE BARRY, F.R.S.

MR. R. T. GLAZEBROOK, F.R.S. (*Director*), attended.

10. The Committee had under consideration a Memorandum by the Director (*see* Appendix), calling attention to the Scheme for the organization of the staff contained in the Memorandum of February, 1904, in which the following grades of Assistants were recommended :—

	£ £
Principal Assistants	300–500
Assistants	200–300
Junior Assistants	100–150
Student Assistants	50–100

It was agreed, after discussion, to adopt this Scheme, subject, however, to the proviso that, for the present, in accordance with the views expressed by H.M. Treasury in their letter of December 26th, 1904, the maximum stipend paid to any member of the staff below the grade of Superintendent shall not exceed £400. It was also agreed, for the guidance of the Committee in the future, that Principal Assistants, Assistants, and Junior Assistants, should, so far as the funds available allow, receive annual increments to their stipends of £20, £15, and £7 10*s.* respectively, being in each case 5 per cent. of the maximum stipends now assigned to the respective grades.

The Principal Assistants will ordinarily be the heads of the various divisions of the Laboratory, and certain senior members of the staff whose time is chiefly given to important research work.

The following were appointed Principal Assistants with stipends of £300 :—

Mr. A. Campbell.
Mr. F. J. Selby.
Mr. C. C. Paterson.
Mr. F. E. Smith.
Mr. H. H. Jeffcott.

The following revisions of stipends of Assistants were also agreed to :—Mr. C. Jakeman from £250 to £280 ; Mr. W. Hugo from £250 to £265 ; Mr. S. W. Melsom from £250, as recommended December, 1907, to £265 ; Mr. E. H. Rayner from £200 to £230 ; Mr. L. Bairstow from £200 to £215. The stipend of Mr. F. C. A. H. Lantsberry, Junior Assistant, was raised from £125 to £132 10*s.* In each case the revision of stipend is to date from April 1st, 1908.

The revision of certain other stipends was considered, but action was postponed pending a decision as to an insurance scheme.

The Director also suggested that, in addition to the above increments of stipend, an annual sum of, say, 10 per cent. of his present salary be set aside annually by the Committee for each member of the staff above the grade of Junior Assistant who has served five years since the date of his first appointment, this sum to be invested in an endowment policy, or utilized in some other way for his benefit on ceasing to be a member of the staff.

After discussion, the consideration of the Scheme was adjourned, and the Director was instructed to obtain further information in the meantime.

11. *Eskdale Muir.*—The question of the staff at Eskdale Muir Observatory was further considered, and the following appointments and arrangements were approved :—

As Observer, Mr. A. E. Gendle, at a commencing salary of £120 ; as Computer, Mr. W. C. Parkinson, at a commencing salary of £85, with, in each case, an initial allowance of £5 for travelling expenses.

The appointments to be on the usual terms applying to Junior Assistantships in the Observatory Department, and subject to the condition that either officer may be transferred to the Observatory Department at Richmond, for temporary or permanent duty. The appointment of Mr. Gendle to date from March 1st, and of Mr. Parkinson from March 15th.

As Caretakers, Mechanic and Housekeeper, Mr. M. Black and wife, at a salary of 40*s.* a week, with a furnished house, and coals. This appointment dates from March 23rd, 1908.

The Observer and Computer have furnished rooms, with coals, and pay the Housekeeper for board, &c., according to a tariff to be approved by the Director.

[APPENDIX.]

Memorandum by the Director, February 17th, 1908.

The accounts for 1907, which will be before the Committee on February 21st, show a balance of £301 15*s.* 6*d.* In addition a sum of £500 has been carried to the General Equipment Account, and of this £253 2*s.* 3*d.* remains unspent. Thus the actual balance on the year's working amounts to £554 17*s.* 9*d.*

The Secretary of the Treasury has intimated to the Royal Society that the Annual Grant will be raised by £1,000, *i.e.*, from £6,000 to £7,000.

The Director thinks that, in view of these facts, the Committee will wish to consider some substantial additions to the salaries of the staff, more especially as with some few exceptions there have been no changes for the past three years.

In their Memorandum to the Treasury of February, 1904, the Committee recommended the following grades of Assistants :—

	£ £
Principal Assistants	300–500
Assistants	200–300
Junior Assistants	100–150
Student Assistants	50–100

The Treasury in their reply expressed the view that £400 should be the upper limit for the Principal Assistants, and the Director would suggest that, with this modification, effect should now be given to the scheme. He also suggests that the Committee should decide that for the future the Principal Assistants, Assistants, and Junior Assistants should receive annual increments of 5 per cent. of the maximum salary attached to the respective grades.

The Principal Assistants would naturally be the heads of the various Divisions of the Laboratory, and certain senior members of the staff whose time is chiefly given to important research work.

The Director will be prepared to bring up at the meeting definite recommendations to give effect to these proposals. The immediate increase in the salary list will be about £400, while the annual charge for increments would for the present be £300.

The Director also wishes to raise the question of provision for retirement.

He would suggest that in addition to the above increase in salary there be assigned to each member of the staff of over five years' service, above the rank of Junior Assistant, an annual sum of (say) £25, or possibly 10 per cent. on his present salary, on condition that he takes out some form of insurance policy for this sum. According to one scheme a man of thirty can secure by his annual payment of £21 6*s.* 4*d.* an assurance of £765, payable at death or attainment of the age of sixty years, or alternatively a pension of £50 for thirty years certain. The policy would belong to the assured, but the Laboratory would retain it and pay the premium so long as he remained on the staff. The immediate annual cost of this would be from £200 to £250.

The Director also suggests the appointment of three additional members of the staff, probably Junior Assistants. One of these is needed in the Engineering Department, another in the Division of Electrotechnics, and a third in that of Electrical Measurements. The expenditure involved in this would be about £400.

iv. Letter (C. 42) of 18th November, 1907, from Dr. Glazebrook to Mr. Walker notifying his appointment.

Letter of 29th November, 1907, with reference to the provision for guest rooms at the Observatory.

v. Memorandum on the conditions of appointment of assistants at the Physics Department of the National Physical Laboratory referred to in the minutes appointing the staff of the Eskdalemuir Observatory (p. 10) :—

THE NATIONAL PHYSICAL LABORATORY.

ASSISTANTS IN THE PHYSICS DEPARTMENT.

Conditions of Appointment.

The Appointments are made by the Executive Committee of the Laboratory and are subject to three months' notice on either side (Minute of March 13th, 1901). The Assistants are responsible to the Director for the proper performance of such duties as may be assigned to them. The general control of the work in each department rests with the Assistant at the head of that department.

Each Assistant must be qualified to take general charge, under the Director, of some branch of the work undertaken by the Laboratory, and in the absence of the Assistant at the head of his department, must be prepared to become responsible, if required, for carrying on the work.

The work divides itself into two sections :—

(i.) The construction and maintenance of standards, the carrying out of tests and the issue of certificates. Each Assistant will be required to take a share in this section of the work and to carry out such tests as may be assigned to him in an orderly and businesslike manner.

(ii.) Research. The Executive Committee determine from time to time the questions which require investigation in the Laboratory. It will be the duty of Assistants to undertake these under the direction of the Director.

Scientific results obtained are to be published only at the discretion of the authorities of the Institution, who reserve the right to publish them also in the volume of the Collected Researches of the Laboratory.

The normal Laboratory hours will be from 9.30 a.m. to 1 p.m. and 2 p.m. to 5 p.m. On Saturdays the Laboratory closes at 1 p.m.

Copy of Minute of July 10th, 1901.

The Superintendent and Assistants in the Laboratory are required to give their whole time during official hours to the performance of their official duties, and all work done for the Laboratory is to be treated as confidential.

No professional work may be undertaken out of official hours without the permission of the Director who shall report each case to the Executive Committee.

The grant of this permission by the Director shall be subject to review by the Executive Committee and shall not be given to the holder of any post in cases where the work is, in the judgment of the Committee, inconsistent with the position of the applicant or with the duties of his post.

Copy of Minute of June 12th, 1901.

That in addition to the usual statutory holidays and Bank Holidays, an Assistant in the Laboratory be allowed four weeks' vacation in each year.

Copy of Minute of February 17th, 1905.

That the normal hours of work should be 9.30 a.m. to 5 p.m., with the proviso that Members of the Staff are expected, at the discretion of the Director, to stay beyond these hours when pressure of work requires it.

Copy of Minute of January 15th, 1905.

That the taking out of patent rights by the Staff, connected with or relative to work carried on in the Laboratory, be not permitted except in special cases and under special conditions approved by the Executive Committee.

vi. Memorandum dated October, 1907, as to the appointment of Observer and Computer at the Observatory :—

[COPY.]

ESKDALE MUIR MAGNETIC OBSERVATORY.

Appointment of Observer and Computer.

October, 1907.

The specific duties attached to these posts cannot be exactly defined probably until after the appointment of the principal officers.

The following statement may, however, be of use to intending applicants.

(1) *Observer.*—The salary will start at from £125 to £150 per annum. The routine duties will be mainly those ordinarily assigned to an observer in a magnetic and meteorological observatory, viz., keeping the records of the self-recording instruments, making eye observations of such magnetic and meteorological instruments as are not recording, assisting in tests on new instruments, measuring up the curves of the recording instruments, &c. The observer will also be expected to take his share in the research work going on in the Observatory.

(2) *Computer.*—Commencing salary, £75–80. The main duties will probably be those of measuring up the curves from the recording instruments, preparing the Tables, and assisting the Observer in his work.

Some knowledge of photography will be required by both Assistants who will have to develop the photographic records.

In addition to their stipends each Assistant will have, free of rent, a bachelor's room in a house attached to the Observatory, paying the housekeeper for his board in accordance with terms to be arranged. The room will be furnished.

vii. Correspondence (C. 42) with Mr. A. E. Gendle as to his appointment as Observer as from March 1st, 1908, with a stipend of £120, an allowance of £5 for expenses, and a promise of coals free of charge.

viii. Correspondence with Mr. W. C. Parkinson as to his appointment as Computer at a commencing salary of £85, with an allowanee of £5 for travelling expenses, furnished rooms with coals.

ix. Correspondence with Mr. Mark Black as to the appointment of himself and his wife as mechanic, caretaker, and housekeeper.

x. Correspondence with R. Laidlaw as to his appointment as handy man.

xi. Report by the Director on Visit to Eskdalemuir July 10th, 1908, and various details of improvements required in the Buildings.

xii. Memorandum dated April 22nd, 1910, by Dr. Chree, entitled "Regulations as to Staff at Kew."

xiii. Statement by Dr. Glazebrook as to Staff, method of working, and payment of expenses at Kew Observatory after July 1st, 1910, dated April 26th, 1910.

It was agreed, on the nomination of the Gassiot Committee :—

1. That the appointment of Charles Chree, ScD., F.R.S., as Superintendent of the Kew Observatory dating from May 15th, 1893, be continued as from July 1st, 1910, on the terms laid down in the minutes of the Kew Committee of March 1st, 1893, April 28th, 1893, and May 26th, 1893, as modified by minutes of the Executive Committee of the National Physical Laboratory of March 13th, 1901, and April 14th, 1905, increasing the salary to £600 per annum with a payment in addition of £56 10*s*. 10*d*.

in May of each year for securing an annuity of £100 per annum at the age of 60 years from the Scottish Provident Institution.

2. That the appointment of G. W. Walker, M.A., as Superintendent of the Eskdalemuir Observatory, dating from January 1st, 1908, be continued as from July 1st, 1910, on the terms laid down in the minutes of the Executive Committee of the National Physical Laboratory of November 15th, 1907, assigning £400 per annum as salary with a house and other allowances.

3. That Dr. Chree, Superindendent of Kew Observatory, be appointed as Assistant-Director of Observatories as from July 1st, 1910, with such duties in connexion with the organisation and arrangement of the Observatories at Kew, Eskdalemuir, and Valencia, in addition to those of Superintendent of the Kew Obervatory, as the Director may assign.

It was further agreed,

4. That the appointments of the following members of the existing Staff of the Kew Observatory be continued by the Meteorological Committee on the same terms as under the National Physical Laboratory until March 31st, 1911 :—

Mr. E. Boxall, appointed boy-clerk 1892. Junior assistant since January, 1897. Present salary £150 a year.
Mr. B. Francis, appointed boy-clerk 1896. Junior assistant March, 1901. Present salary £137 10*s.* a year.
Mr. G. Harris, appointed boy-clerk May, 1906. Present salary 18*s.* a week.
Mr. F. Levin, appointed boy-clerk January, 1908. Present salary 14*s.* a week.
Mr. W. R. Corrin, Senr., caretaker, appointed January, 1905. Present wages £1 7*s.* 6*d.* per week.

5. That the appointment of the members of the Staff of the Eskdalemuir Observatory be continued by the Meteorological Committee upon the same terms as under the National Physical Laboratory until March 31st, 1911, as follows :—

Mr. A. E. Gendle, Observer ; present salary, £135 per annum.
Mr. W. C. Parkinson, computer ; present salary, £95 per annum.
Mr. M. Black, mechanic, with wife as caretaker ; £2 2*s.* per week.
R. Laidlaw, handy-man ; £1 per week.

Magnetic Observations at Valencia.—Read—the following letters (M.O. 1351) :—

Burlington House,
London, W.
29th April, 1910.

DEAR SHAW,

I ENCLOSE a copy of a letter received by the Secretaries of the Royal Society with regard to a small Fund collected by the late Lord Rosse for the maintenance of magnetic observations at Valencia Observatory.

The matter has yesterday been before the Council of the Royal Society, and they are willing to assent to the proposal that the Fund should be transferred to the Royal Society in trust for the maintenance of the observations referred to, provided the Meteorological Committee are prepared permanently to continue those observations and to receive the income of the Fund for that purpose.

I should be obliged, therefore, if you would lay the matter before the Meteorological Committee and communicate their decision to me at an early date.

Yours very truly,
A. B. KEMPE,
Treasurer R.S.

Dr. W. N. Shaw, F.R.S.

Birr Castle Observatory,
Ireland.
17th April, 1910.

DEAR SIR,

LORD ROSSE has asked me to write to you with regard to the money which his late father collected for the maintenance of the magnetic observations in Valencia. The amount collected by him was invested in Bank of Ireland Stock in the account of Lawrence, Earl of Rosse, Rev. Maxwell Close, and Professor G. F. Fitzgerald. The amount of Bank Stock is £119 18*s.* 6*d.*, producing a dividend of about 11½ per cent. Of this, £6 were paid half yearly to the Meteorological Council to be handed over to the observer at Valencia (I think his name is Cullen) who attends to the meteorological and magnetic observations. Since Lord Rosse's death on 31st August, 1908, no payment has been made, neither has the dividend been claimed from the Bank of Ireland. There was a credit balance of £26 15*s.* 11*d.* standing in the local bank here on July 21st, 1909, to which the unclaimed dividend should be added, producing a total credit balance to date of about £40. It appears now as if, on the death of Messrs. Close and Fitzgerald, Lord Rosse had asked Professor John Joly in Dublin to act as a trustee ; this was, however, done quite informally without notifying the Bank of Ireland of the appointment. I think, therefore, that the late Lord Rosse's executors will have to appoint new trustees for the administration of the fund, and we think that it ought to be vested in the Royal Society. The Bank will transfer the stock " as soon as the late Earl of Rosse's death over the account is proved," as I am informed by the Secretary.

Believe me, &c.,
OTTO BOEDDICKER.

It was agreed to return the following reply :—

The Meteorological Committee are willing to allow the observer at Valencia to continue the magnetic observations, and to pay over to him the sum of £12 per annum as heretofore so long as the Gassiot Committee consider the observations to be necessary.

They suggest that steps be taken to provide that, in case the observations as at present arranged should be discontinued for any reason, the money should be held in trust by the Gassiot trustees for advancing the science of terrestrial magnetism in Ireland.

249. *New Office at South Kensington.—Programme of Removal.*—Reported—that the following programme for furnishing and completing the rooms in the new building had been sent to the Office of Works for comments. (P.C. D210).

PROGRAMME for FURNISHING and COMPLETING the ROOMS in the NEW BUILDING.

With the exception of certain special items, new furniture is required for the following rooms, and should be in the building ready for use on 1st September, 1910 :—

9. Director's Assistant.
   Passage between Director and Museum.
10. Museum.
11. Ante room.
13. Correspondence and Accounts.
14. Superintendent.
20. Typist.
21. Tea room.
24. Messenger.
25. Forecasts.
    Inner vestibule and staircase.

The following rooms, for which existing furniture and fittings should be adapted as far as they will go, should be ready for occupation on October 6th, 1910 :—

7. Director.
8. Superintendent.
15. Observatories.
17. Instruments.
19. Superintendent's Laboratory.
23. Store.
26. Superintendent.

The following rooms, which also will be furnished mainly by existing furniture and fittings adapted to meet requirements, should be ready for occupation on October 22nd, 1910 :—

5. } Store.
6. }
16. Marine.
18. Marine.
22. Ladies.
27. Physical Laboratory and Dark Room.

Rooms 1–4, 12, can be finished off according to opportunity.

PROGRAMME for REMOVAL of the WORK of the METEOROLOGICAL OFFICE to SOUTH KENSINGTON.

September 1st–30th.—Removal and arrangement on new shelves of the Library, &c., all books (except Logs), Files of Letters, Press Copy books, Letter Registers, Manuscript Records of stations, Bound Working Charts, Bound volumes of Observatory tabulations, Stock of envelopes, and Stores.

During the month of September.—Shelving in rooms 2, 3, 5, 6, 9, 10, 13, and 14 (old office), to be taken down as emptied and arranged to furnish shelving required for rooms 15, 17, 19, 23 (new Office), and as far as possible for 5, 6, 16, 18, 22.

Staff of room 1 to see to the removal of instruments. All rooms in the new building, except Marine Rooms, *i.e.*, Nos. 16, 18, and 22, to be ready for commencing work there on October 6th.

October 6th.—Staff of rooms 1, 2, 3, 5, 8, 9, 10, and 13, of old Office, to take up their work in new quarters.

October 7th.—At 63, Victoria Street :—

Staff of room 12 to move to 13.
„ „ 11 „ „ 10.
„ „ 4 „ „ 5,

using furniture left there, and carrying with them from their own rooms indispensable requisites.

October 8th.—Removal of furniture, except that required in 13, 10, and 5.

October 10th–22nd.—Logs to be taken down, dusted, and stacked ready for removal. Take down shelving, and complete fittings in 16, 18, and 22, and in 5 and 6 (new building). Remove and arrange logs in new premises.

October 24th.—Rest of staff take up quarters in new building. Transfer of Lumber Room and roof stores. Available material in Lumber Room can be used for fittings in room 27 or Basement.

250. *Fifth Annual Report.*—It was agreed to present a report on the same lines as last year, with corresponding appendices, also to authorise the preparation of a list of additions to the Library during the five years 1905–1910, for separate issue.

251. *Anemograph Stations.*—Read—the following letter (M.O. 1143) :—

West and South Clare Railways,
Engineer-in-Chief's Offices,
Clare Chambers, Limerick.
12th April, 1910.

DEAR SIR,

WITH reference to the interviews you were good enough to grant me last month and the suggestion I made that this Company should establish an observatory, I have submitted the matter to my Board and am authorised to say—

That if you can see your way to supply them with suitable instruments free of charge to them, they will be prepared to erect them in accordance with your instructions adjoining Quilty Station, which is the most exposed place on their line, and to agree that their Station Master shall attend to them and post the automatic record sheets daily to you without any charge to your department.

The wind gauge should make an electric connection that would ring an alarm bell in all stations when the wind velocity reached 65 miles an hour, and another electric connection when the velocity reached 85 miles per hour.

My Board will undertake to do all in their power to see that the instruments are maintained in working order, but as the district is isolated and the staff at our disposal not very highly skilled they hope that some skilled official from your Department will inspect the instruments periodically to test them and give us any help in your power to have them maintained in proper working order.

I am, &c.,
W. BARRINGTON.

The Director,
Meteorological Office.

It was agreed to lend a pressure-tube apparatus for a term of years long enough to obtain a satisfactory series of records of the velocity of the wind on the exposed west coast of Ireland, provided it was made clear that the Committee undertook no responsibility in respect of casualties due to wind.

252. *British Antarctic Expedition*, 1910 (Minute 243).—Reported—that at the request of Dr. G. C. Simpson (M.O. 879) instruments had been ordered in accordance with a revised and extended list of apparatus required for two stations, one on King Edward Land and one at the base station on Ross Island, on the understanding that if upon reconsideration at Dr. Simpson's request the Meteorological Committee decided not to provide the additional instruments, the expedition would pay for them. The revised list of instruments is as follows :—

LIST OF INSTRUMENTS SUPPLIED FOR THE BRITISH ANTARCTIC EXPEDITION, 1910.

	£	*s.*	*d.*
2 M.O. pattern station barometers (75*s.*)	7	10	0
3 medium size baragraphs (60*s.*)	9	0	0
2 spring thermographs (70*s.*)	7	0	0
2 small cup anemometers (indicating) (90*s.*)	9	0	0
16 ordinary mercurial thermometers—40° + 60° (5*s.* 6*d.*)...	4	8	0
18 spirit minimum thermometers—70° + 60° (11*s.*)	9	18	0
6 mercurial maximum thermometers—40° + 70° (12*s.*)	3	12	0
2 "Adie" wind vanes (21*s.*)	2	2	0
3 M.O. pattern shipboard screens (10*s.*)	1	10	0
3 M.O. pattern Stevenson's screens, portable (47*s.* 6*d.*)	7	2	6
2 Fuess barometers, complete as quoted (£13 10*s.*)	27	0	0
2 special sunshine recorders (lent by Admiralty)		—	
4 solar radiation thermometers, black bulbs (18*s.* 6*d.*)	3	14	0
1 Kew pattern marine barometer, "A" (80*s.*)	4	0	0
1,000 cards for sunshine recorders (De la Rue)		—	
1 Besson's nephoscope	1	15	0
2 extra cups for anemometers	1	10	0
	£99	1	6

It was agreed that the instruments be lent with the exception of the wind vanes and the Fuess barometers, on the understanding that no charge would be made by the National Physical Laboratory for testing the instruments.

253. *Director's Report and Accounts :—*

Publications.—The issue of the British Meteorological Year Book, 1909, was completed and copies sent to be bound on 22nd March.

It was agreed to comply with a request (M.O. 1,293) from the London School of Economics and Political Science for the presentation of a copy of the Year Book to the library of the school.

The changes in the Monthly Meteorological Charts of the Atlantic Ocean and Indian Ocean have been carried out in accordance with Minute 241. The first weekly issue of the Atlantic Charts containing daily charts of pressure, wind, &c. over the ocean and adjoining continents for the week ending 13th April, was made on Thursday, 14th April. The Stationery Office arranged for the extension of the Chart of the Indian Ocean to latitude 35° S. on the same scale as last year's charts for the current year only, on the understanding that in the course of the year a decision would be arrived at as to the most appropriate range and scale of the charts in future, and the part, if any, which the Commonwealth Bureau of Australia would take in the preparation of the charts for the joint use of the two offices.

Daily Weather Service.—(*a*) Provision has been made as from 1st April, 1910, for a column of remarks on the further outlook on p. 3 of the Daily Weather Report and in the forms for weather prospects for issue to the press each morning and evening in accordance with the Programme of Work, Minute 218 (*see also* Minute 209).

(*b.*) Correspondence has passed between the Office and the Admiralty with reference to the supply of a daily telegram by radiotelegraphy from Gibraltar. On 6th April a letter was received asking that the Committee be informed that it is considered that the consent of the Marconi Company would be required for the transmission of weather messages by wireless telegraphy from naval shore stations and that steps should be taken to ascertain whether the Marconi Company have any objections to the proposed arrangements.

In reply to an informal request for the view of the Marconi Company upon the matter, a letter (M.O. 1,249) was received on 22nd April, 1910, from Mr. W. W. Bradfield, of the Marconi Company, stating that "without entering into any discussion as to the scope of the Admiralty-Marconi agreement, and entirely without prejudice to such rights as we may have thereunder, the Company has no objection to your proceeding in this matter in conjunction with the Admiralty as indicated in your letter."

Audit of Instruments.—Mr. Corless has audited and certified the stock of M.O. instruments for sale, issue to stations, &c., on 31st March, 1910 (M.O. 1,460) in accordance with the suggestion of the Comptroller and Auditor-General (Minute 168).

Reports of work.—1. *Marine Branch.*—Data for Eastern Archipelago completed for Admiralty, and data for South America and West Coast of England in preparation. 45 meteorological logs, 2 short logs, 2 lighthouse registers, 298 North Atlantic registers, 96 registers for radiotelegraphy, and 50 Indian Ocean registers examined. A weekly edition of the North Atlantic Meteorological Chart issued from April 14th. Charting data for extension of Indian Ocean Meteorological Chart to 35°S. Issuing forms and instructions to ships sending wireless weather reports, and obtaining errors of barometers. (vii.) Preparing reproductions of daily weather charts of the Antarctic Seas. The charts for the year 1903, and January to March, 1902, are now passing through the press, and the reductions for April and May, 1902, are well advanced.

The estimation of costs (at rates ordinarily charged) of work done for public offices, £40 7*s.* 6*d.*

2. *Forecast Branch.*—Daily Weather Report. Correction sheets for January, February, and March, 1910, issued. Addition of "Further Outlook" to the ordinary forecasts commenced on April 1.

Weekly Weather Report. Remarks prepared to accompany Monthly Summaries for February and March, also General Remarks for Registrar-General's Quarterly Return.

Checking of 8.30 p.m. Forecasts completed to end of February. The Summaries of Results for 1909, the preparation of which was accidentally delayed, are now submitted.

Final checking of Storm Warnings issued in 1909 completed. The results are submitted herewith.

Wireless Telegrams. 273 messages from Atlantic liners were received in March, and 331 messages in April. Observations plotted on working maps and isobars extended over Atlantic. Carbon copies of messages received from a large number of ships and compared with telegrams previously received; notes respecting imperfections in reports prepared and handed over to Marine Branch.

Monthly Meteorological Charts of North Atlantic and Mediterranean. Daily maps prepared for publication on back of charts commencing with 7th April. Maps, which are drawn from all available information, show the weather conditions prevailing at 7 a.m. over the whole of Europe, the North Atlantic and a portion of the North American continent.

(ix.) Isallobaric maps prepared daily for the two periods 7 a.m. to 6 p.m. and 6 p.m. to 7 a.m.

(*g.*) Gradient Wind Velocity. Information for the four stations Valencia, Scilly, Dover and Yarmouth tabulated to date. Seasonal diagrams prepared showing for each station the conditions prevailing in 1909.

Wind Velocity Sheets. Tabulation completed to end of March and checked to middle of March.

3. *Statistical and Library Branch.*—British Meteorological Year Book, Parts I., II., III. up to date. Usual work for library. Inquiries (March and April, 1910) as follows: Newspapers, 24; Legal, 18; Scientific and Commercial, 81; Forecasts, 6; General, 6. The receipts in connexion with these amounted to £6 13*s.* 3*d.*

The estimate of cost (at rates ordinarily charged) of work done for public offices is as follows:—

	£	*s.*	*d.*
English Registrar-General	5	12	6
Irish " "	0	17	6
	£6	10	0

4. *Instruments Branch. Observatories.*—Preparation of Year Book, Part IV., for printer. The printer has the copy for the month of March, 1910, and proof of the Valencia issue for March has been received and passed for press.

The sunshine records from the Falkland Islands for January to November, 1909, have been tabulated and the monthly duration of sunshine ascertained.

The records from Georgetown, British Guiana, for the years 1906, 1907 and 1908 have also been measured, and the mean hourly duration of sunshine found for each month of the year.

Records have been received from the following new stations :—
Anemograms from Llaneugrad.
Barograms and Thermograms from Guayanavieja (Venezuela).
Sunshine cards from Deal.

A selection of Meteorological Records has been made and mounted for the Japan-British Exhibition.

The examination of the Observatory records, checking the measurements of the sunshine cards, and tabulation of the wind and rain curves have been kept up to date. The curves and tabulations received from the Observatories are satisfactory.

(xv) Normals for 1871–1905 : (6) Sunshine, Diurnal Variation, &c., in hand.

Instruments.—The usual Admiralty and office work.

The instruments at St. James's Park and the Churchyard have been examined and kept in order.

Instruments have been supplied against repayment as follows :—

Stonyhurst College.	Clongoweswood College.
International College, Smyrna.	Captain J. S. Reeve, Lincoln.
Northern Lighthouse Board.	H. Tudor Williams, Esq., Salisbury.
Irish Lights Office.	Victoria Park, Swansea.
S. H. R. Salmon, Esq., Brighton.	Potsdam Observatory.
Neville Holden, Esq.	W. J. Farrer, Esq., Carnforth.

A large size barograph has been supplied to the Telegraphic Reporting Station at St. Anne's Head, Pembroke, and thermometers have been renewed at Jersey, Sumburgh Head, and Scilly.

The Direction Recorder lately at Pyrton Hill has been lent to the balloon factory at Aldershot.

Storm Cones have been renewed at Newlyn and Kingstown.

Eight requisitions have been received from the Crown Agents for the Colonies, and two from the Commonwealth of Australia.

Six requisitions are now in hand.

5. *Investigation of the upper Air.*—(Quarter ended 31st March, 1910). The ordinary work of the station has been carried on as usual during the quarter. Owing to delay in the arrival of the hydrogen cylinders from Aldershot no balloons could be sent up on the international days at the beginning of February, but to avoid a similar mishap in future a supply of calcium hydride and a gas generator has been obtained.

Out of six registering balloons sent up during the quarter five have been returned. The average height attained has been only 12 kilometres compared with a previous average of over 15 kilometres. It is believed that this is due to the use of inferior rubber, but the price of the balloons has risen.

Some larger and more expensive balloons have been used in an endeavour to reach greater heights, and it is obvious that, *cæteris paribus*, such balloons must rise higher, but the experiment has not been justified by the results, since the heights reached by these larger balloons are less than those often previously reached by the smaller balloons.

I am glad to be able to report that no accident has occurred during the ascent of kites, notwithstanding the very stormy character of January and February.

Accounts.—Attendance at Courts of Law.—The payment to the representative of the office of one-half the fee of 10*s.* 6*d.* for attendance on subpœna on days when he is not called as a witness has been authorised, in addition to the payment of the full fee of 10*s.* 6*d.* for each day's attendance when he gives evidence.

Superannuation.—The women clerks have requested that the amounts reserved from their pay in view of superannuation allowance be invested at compound interest in the Post Office Savings Bank instead of being devoted to endowment assurance policies.

Sanctioned.

The deferred pay for Mr. Parsons (£10), Mr. Pycock (£5), and Mr. A. G. Goad (£7 10*s.*), will be invested in endowment assurances in the Civil Service Insurance Society in accordance with Table F. (without profits) of the Society's prospectus.

Reported—purchase on 4th March, 1910, of £438 2½ per cent. Annuities, in accordance with the Estimates for 1909–10 (Minute 175) at a cost of £351.

Observing Station at Scilly.—As from April 1st the work of the station at Scilly has been transferred to the coastguard. The retiring observer, Mr. A. Hicks, requests some consideration on account of age and long service (M.O. 1,047).

The payment of the salary for the Midsummer quarter was approved.

Submitted—the following statement :—

	£	*s.*	*d.*
Bank balance on 28th February, 1910	3,852	5	8
Receipts from 1st March to 30th April, 1910	5,284	12	4
	9,136	18	0
Cheques drawn from 1st March to 30th April, 1910	4,087	13	4
Bank balance on 30th April, 1910	£5,049	4	8

Submitted—The following Statement of Accounts for the Year ending 31st March, 1910 :—

RECEIPTS.					PAYMENTS.			
1908-9. £ s. d.		£ s. d.	1909-10. £ s. d.		1908-9. £ s. d.		£ s. d.	1909-10. £ s. d.
2,413 9 3	Balance from year 1908-9	—	2,327 10 4		1,000 0 0	Director	—	1,000 0 0
15,500 0 0	Parliamentary vote	—	15,900 0 0					
						OFFICE SALARIES :		
					6,508 2 5	Clerical Staff, monthly	2,507 15 0	
	DEPARTMENTAL EXPENSES REPAID :					,, ,, ,,	4,347 6 10	
176 8 9	Forecasts, &c. ...	175 3 4				,, ,, weekly	230 6 8	
	Marine, Statistics, and Observatories				752 1 6			
145 5 7		83 3 3				Messengers, ,,	305 4 6	
136 6 10	Instruments ...	136 7 6						7,390 13 0
			394 14 1		718 13 11	OFFICE EXPENSES : Rent, Fuel, &c. ...	727 0 8	
	INCIDENTAL EXPENSES REPAID :				139 3 7	Furniture, Fittings, &c.	123 4 11	
330 16 7	Forecasts, &c. ...	365 15 3			317 18 11	Incidental	277 12 3	
114 0 11	Other Branches ...	98 18 6						1,127 17 10
						POSTAGE AND TELEGRAMS :		
52 13 7	Stationery Office Account ...	53 4 4			227 7 4	General Postage ...	270 6 5	
			517 18 1					
	TELEGRAPH CHARGES REPAID :				265 9 6	Postage of Daily Weather Reports ...	317 13 6	
					2,094 5 0	Telegrams, &c. ...	2,201 7 2	
135 18 5	Home	139 18 1						2,789 7 1
484 15 10	Telegrams sent abroad	446 8 11			315 7 2	TRAVELLING EXPENSES AND INSPECTIONS...	—	341 6 7
			586 7 0					
	INSTRUMENTS :				1,802 2 4	SUPERANNUATION ...	—	1,726 13 9
219 1 0	Royal Navy ..	510 5 5						
	Mercantile Marine					COST OF INSTRUMENTS :		
1,224 4 4	Stations, &c. ...	1,248 9 11			219 1 0	Royal Navy	510 5 5	
			1,758 15 4			Mercantile Marine		
	SUPERANNUATION ACCOUNT :				1,605 7 0	Stations, &c. ...	1,779 14 10	
570 0 0	Annuities	566 5 0						2,290 0 3
	Interest on Investment ...					ALLOWANCES FOR OBSERVATORIES, OBSERVERS, &c. ...		
41 3 5		52 19 0			3,297 2 9		—	3,273 4 2
	Income Tax returned							
—		9 7 6				LECTURES AND EXPERIMENTS... ...	—	385 2 8
			628 11 6		353 4 8			
398 2 6	LECTURES AND EXPERIMENTS ...	—	411 3 8					
					2,293 5 1	BALANCE : Cash at Bank ...	2,153 0 4	
0 10 5	AMOUNT REFUNDED	—	—		34 5 3	,, at Office ...	38 14 4	
					—	Advance for Inspections	15 0 0	
								2,206 14 8
£21,942 17 5			£22,525 0 0		£21,942 17 5			£22,525 0 0

LIABILITIES.			ASSETS.		
£ s. d.		£ s. d.	£ s. d.		£ s. d.
1,382 9 4	To sundry creditors	1,437 0 4	2,327 10 4	By cash at Bank and at Office ...	2,191 14 8
—	,, salaries reserved	90 16 8	—	,, advance for Inspections	15 0 0
352 1 2	,, balance	1,460 17 11	125 8 9	,, M. O. Instruments in Stock ...	228 17 8
			281 11 5	,, Sundry debtors	553 2 7
£2,734 10 6		£2,988 14 11	£2,734 10 6		£2,988 14 11

NOTE.—On 31st March the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £2,761 1*s.* 3*d.*

THIRTY-FIRST MEETING.

63, *Victoria Street, London, S.W., 6th July*, 1910.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	MR. MIDDLETON.
SIR G. H. DARWIN.	REAR-ADMIRAL PUREY-CUST.
CAPTAIN HARVEY.	DR. SCHUSTER.

254. The Minutes (246–253) of the Thirtieth Meeting (4th May, 1910) were read and confirmed.

It was agreed that copies of Treasury Minute, dated 20th May, 1905, and of Minutes of the Committee passed in May and July, 1905, delegating certain powers to the Director, should be circulated to the new members of the Committee upon their appointment. (*See* P.C. 2337/05.)

255. *Fifth Annual Report.*—The draft Report for the year ended 31st March, 1910, was approved.

256. *New Office at South Kensington* (Minute 249).—(a) *Lease.*—The Director reported that on 19th May, 1910, he had received from the Treasury solicitors a draft lease of which the following is an abstract :—

Particulars of Lease from the Commissioners of H.M. Works and Public Buildings to the Permanent Secretary of the Treasury and the Director of the Office as Trustees of the Meteorological Committee of rooms or offices coloured pink on a plan, with use in connexion with lessors of parts coloured blue [and the roof], including lift, reserving the free passage of water and soil from any other premises through the channels, &c. now or hereafter belonging to the premises, also the free use of gas, water, and sort pipes, electric mains, wires, appliances, heating apparatus, watercourses, and drains, not exclusively belonging to the premises as run, now or hereafter, about the premises, reserving also right of entry for repairs.

Term, 21 years, from 25th December, 1910.

Rent, £640, with £40 for heating.

Lessees' Covenants :—

1. To pay the rent.
2. To do all internal repairs and maintenance, including lift, hot water supply, electric light fittings, and all other fittings and fixtures, employing the lessors as agents for the execution of all repairs. To repay the wages of a lift attendant (no hours fixed) appointed by the lessors.
3. To paint and distemper the demised premises to colours, &c. approved by lessors. To keep the staircases, &c. clean, recovering one-quarter of the cost from the lessors if the top floor is occupied by them.
4. Usual provision for access for inspection.
5. Not to cut, maim, or injure the walls, timbers, or floors, nor alter or in any way interfere with the construction, plan, arrangement, or architectural decoration.
6. Not to assign or underlet, nor use for any purpose except as offices, laboratories or observatories [or for other reasonable purposes of the Meteorological Office with a proviso that no person shall reside or sleep on the premises].

Proviso for ejectment and re-entry on non-payment of rent.

Lessors' Covenants :—

1. External repairs, supply of electric or other light and keep the premises properly heated [and ventilated].
2. Pay rates, taxes, and water rate.
3. Secure undisturbed possession.

Proviso for lapse of rent if uninhabitable for more than six months on account of fire.

[Proviso for cesser in case of discontinuance of the Parliamentary grant for Meteorology.]

The Director reported further that he had seen Mr. Comyn of the solicitor's department and had made representations upon certain points, and that in reply thereto (M.O. 1,765) the Office of Works had agreed to a number of alterations or additions, the chief of which are represented by the words in square brackets in the particulars, and that Sir G. H. Murray, the senior trustee, raised no objection to the proposed terms.

It was pointed out that the Committee being only appointed for five years were not in a position to make a contract for 21 years on their own account and could only do so by instruction of the Treasury; that according to Treasury letter of 30th May, 1907 (Minute 108) the provisions of the lease were contingent upon the Office being "furnished" in the first instance and that the financial arrangements as to furniture were still unsettled, and the responsibilities as to paying the wages of the lift man were undefined. It was accordingly agreed to approve the following draft letter to the Treasury :—

M.O. 1,765.

SIR, 11th July, 1910.

THE Meteorological Committee have received from the Solicitor's Department a draft lease for 21 years of the new premises for the Office at a rent of £640 per annum, with £40 per annum additional for heating, subject to certain covenants on the part of the lessees.

The lessees are the Permanent Secretary of H.M. Treasury and the Director of the Office as Trustees of the Meteorological Committee.

The Committee are dependent upon appointment for five years by Their Lordships' Minute, and their funds are contingent upon the continuance of the Parliamentary Grant for Meteorology.

In these circumstances the Committee would not feel justified in asking their Trustees to enter into a contract for 21 years without previously reporting the matter for Their Lordships' sanction, and without a proviso in the lease to meet the contingency of unforeseen alterations in the meteorological service. We propose to ask therefore for a stipulation that the lease may be determined at any time after the expiration of five years by a year's notice given by the Meteorological Committee, through their Trustees, with Their Lordships' approval.

There are certain details to which in ordinary circumstances the Committee would take exception. It is quite contrary to their practice to undertake to pay a salary of undefined amount for an appointment over which they have no control, as proposed in lessees' covenant No. 2, and as at present advised would not accept without alteration the covenants numbered (3), (5), and (6).

If, however, these conditions have Their Lordships' approval, and the power is secured to the Committee's successors of raising any question of modification required by alterations in circumstances which cannot now be foreseen, they are prepared to authorise the Trustees to sign the lease, with certain verbal modifications as agreed upon between the Solicitors and the Director.

I am therefore to ask you to take Their Lordships' pleasure upon these points.

I am, &c.

(b) *Arrangements for Removal and Date of Opening.*—Reported—that the programme of removal (Minute 249) had been approved by Sir Henry Tanner (M.O. 1,626) and also by the Deputy-Controller of Supplies (M.O. 1,825) : that full notes of the requirements of the several rooms in respect of furniture had been prepared for Mr. Myatt and transferred to Mr. Goddard of the Supplies Division of the Office of Works. They had been discussed in consultation with him but no understanding had been arrived at as to what part of the furniture must be regarded as technical, and therefore excluded from the provision at the expense of the Office of Works ; nor as to the distribution of the work between the Supplies Division and the Architects' Division, depending upon whether it was necessary to plug the walls for the fixing of the woodwork.

It was agreed that the members of the Committee who were in London might be called together as a Sub-Committee to consider any questions arising out of the arrangements for furnishing and removal, including the fixing of a date for the opening ; and the public ceremony, if any, which should be arranged for the occasion.

(c) *Lithographic Press* (Minute 218).—The Director reported that he had been in communication with Mr. Dutton, Superintendent of Printing at the Stationery Office, with regard to the arrangements for the lithographic reproduction of the Daily Weather Report, after removal to the new building ; that Mr. Dutton was prepared to take up the question of supplying a lithographic press to be worked electrically, and that he had reported (M.O. 2,084) that machinery of size sufficient to take the Daily Weather Report, the Atlantic Monthly Chart, and the Indian Ocean Monthly Chart in the form adopted until the commencement of the current year (*see* Minute 241) would not cost more than £400. Mr. Dutton had suggested that the question should be raised by an official letter sent to the Treasury, which could be referred to the Stationery Office for consideration.

The following draft letter was approved :—

SIR,

I AM instructed by the Meteorological Committee to ask you to submit for their Lordships' consideration a proposal for the installation by H.M. Stationery Office of a lithographic printing machine in the basement room assigned to the Meteorological Office in the new building at South Kensington for use in connexion with the Daily Weather Report and other lithographic work of the Office.

Printing on the premises is not a new departure so far as the Office is concerned. A hand press for the printing of the first issue of the morning forecasts and for addressing envelopes has been part of the equipment of the Office for many years. It is the duty of one or other of the office messengers to do the work. In recent years manifold typewriting has taken the place of printing for the forecasts, but we still print the addresses of the "subscribers" to the Daily Weather Report on about 90,000 envelopes.

The primary objects of the proposal are, first, to save time in the issue of the Daily Weather Report, and, secondly, to bring the work of printing and distributing the Report under closer supervision.

The practice at present is to prepare the "black-stone transfers" in the Office ready to be laid down on the lithographic stones and super-printed at the lithographers on "blue-stone" outline maps previously prepared. Every effort is made to economise time in order that the Reports may reach as many towns as possible in course of post on the day of issue. We have recently succeeded in including Manchester, for example, by posting at 1.30 p.m. at Mount Pleasant and the General Post Office. To do that, the "transfer," which represents work based on observations made at 7 a.m. in Northern and Western Europe (including Iceland, Sweden, the Azores, Spain, France, and Germany) is made ready by 11 a.m. and carried by hand to the lithographers. Three Office messengers meet there at 12.30 to fold and envelope about 300 copies of the Reports and carry them to the General Post Office by 1.30 p.m.

The lithographers' works are at Denmark Hill, about equally far from this Office and the post offices, and removal to South Kensington certainly increases the distance that has to be covered, so that a good deal of time is consumed in carrying the work from one part of London to another.

Economy of time is of the first importance. If the work were done on the premises, the time required to carry the transfer from South Kensington to Denmark Hill would be saved, and as the Office will share the new building with the Post Office, probably the special journey of the Office messengers to Mount Pleasant and the General Post Office would be saved. In the alternative, communication by "Underground" and "Tube" would be quicker than anything that is now available between Denmark Hill and the General Post Office, except a taxi-cab. The messengers would carry out the folding and wrapping in the Office instead of the lithographers' shop, where there is no supervision.

The printing of Daily Weather Reports is carried out successfully on the office premises at the Deutsche Seewarte, Hamburg, the Meteorological Institute of Vienna, the Weather Bureau of Washington, the Meteorological Office of Toronto, and the Egyptian Survey Department. There seems no reason why a similar arrangement should not be successful here. Personal enquiry from the authorities responsible for the work at the offices mentioned has, without exception, resulted in strong recommendation of that mode of procedure.

The cost of a suitable machine, to be worked by electricity, is estimated to be not more than £400 including fixing. The necessary provision has been made for supplying the electric current to the basement room in the new building. A lithograghic printer and an assistant, costing together about £4 a week, would be necessary. The item, printing and paper for the Daily Weather Report, is set out in the Stationery Office Return for 1908-09 at £456 17*s.* 5*d.*

Besides the Daily Weather Report, a great deal of lithographic work is done for the Office, the most regular of which is that for the Meteorological Charts of the Atlantic Ocean (of which a weekly edition is now issued) and the Monthly Charts of the Indian Ocean. It would be of great advantage to have the work done under the supervision of the staff responsible for the original drawings. We keep a staff of skilled draughtsmen, and sometimes complain that our drawings are imperfectly transcribed by workmen who do not appreciate the intention of the work. There are besides a large number of lithographic illustrations for publications and of forms which might be worked off by lithography. In present circumstances drawings are cleaned off the stones at the expiration of a fixed limit of time. The proposals contemplate the use of zinc plates, which now often take the place of stones, and which are easily stored for subsequent use.

The Committee therefore see no reason to anticipate any increase in the cost above what is now incurred, and they consider that the proposed scheme would be more efficient from the point of view of the Office work. If their Lordships sanction the proposal, the details could be arranged with H.M. Stationery Office.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury.

(d) *Telephones.*—The Director reported—that he had received an estimate from the Post Office (M.O. 1,625) for domestic telephones at an annual cost of £30 4*s.* per annum, which had to be considered in comparison with an installation by the New System Telephone Co. with whom the Office has a contract for telephones on the present premises lasting until 31st December, 1911, at the rate of £13 13*s.* per annum, with costs of removal estimated as an outside estimate at £123. After correspondence with the Post Office (M.O. 1,909) in view of the fact that it was desirable that the installation be undertaken without delay, he had signed a contract with the Post Office ; at the same time he had signed a contract for one exchange line and six extensions, at an annual cost of £5 for the exchange line on the call rate and 30*s.* for each of the six extensions ; and also a contract of £2 per annum for a circuit between the Forecast Room of the Office and the Post Office instrument room, in order to transact business with reference to the receipt and despatch of telegrams.

(e) *Provision of Apparatus.*—The Director reported that he was taking steps to order recording apparatus for installation at the new Office.

257. *Accounts for* 1909–10.—Submitted—the following comparison of expenditure for 1909–10 (Minute 253) with the estimates (Minutes 175 and 179) :—

COMPARISON OF EXPENDITURE WITH ESTIMATES, 1909–10.

Items.	Heads of Service.	Estimates Nov., 1908. (Minute 175.)	Expenditure, 1909–10.	Excess.	Defect.
		£	£ s. d.	£ s. d.	£ s. d.
1	Director	1,000	1,000 0 0	—	—
2	Office salaries	7,444	7,390 13 0	—	53 7 0
	Office expenses :				
3	Rent, fuel and lighting	725	727 0 8	2 0 8	—
4	Repairs and incidental expenses ...	360	400 17 2	40 17 2	—
	Postage and Telegrams :				
5	Postage	430	587 19 11	157 19 11	—
6	Telegrams from inland stations ...	550	540 4 4	—	9 15 8
7	„ „ abroad	330	353 17 4	23 17 4	—
8	„ sent abroad	530	499 17 2	—	30 2 10
9	„ storm warnings	300	212 12 5	—	87 7 7
10	„ harvest forecasts	55	83 4 2	28 4 2	—
11	„ sundry telegrams	80	84 17 4	4 17 4	—
12	„ private wires, &c.	50	46 18 6	—	3 1 6
13	Wireless reports from liners	400	246 15 2	—	153 4 10
14	Allowances to clerks	220	133 0 9	—	86 19 3
15	Travelling expenses	340	291 6 7	—	48 13 5
16	Superannuation	1,613	1,720 13 9	107 13 9	—
17	Cost of instruments for Office use ...	300	2,290 0 3	590 0 3	—
18	„ „ supply to Navy, &c.	1,400			
19	Allowances for observatories, &c. ...	3,619	3,323 4 2	89 6 10	—
20	Lectures and experiments		385 2 8		
	Total Expenditure	19,746	20,318 5 4	1,044 17 5	472 12 1
	Appropriations in aid :				
21	Departmental expenses refunded ...	418	394 14 1	—	23 5 11
22	Incidental expenses refunded ...	385	517 18 1	132 18 1	—
23	Telegraphic expenses refunded ...	540	586 7 0	46 7 0	—
24	Cost of instruments (Navy)	600	510 5 5	--	89 14 7
25	„ „ (other sources) ..	800	1,248 9 11	448 9 11	—
26	Superannuation	703	628 11 6	—	74 8 6
27	Lectures and Experiments	400	411 3 8	11 3 8	—
	Total of Appropriations in Aid ...	3,846	4,297 9 8	638 18 8	187 9 0
28	Net expenditure	15,900	16,020 15 8	120 15 8	—

NOTES.

Item 2.—The estimates were affected by Minute 190, revising salaries in March, 1909 ; by Minute 197 adding £50 ; by Minute 245 adding a boy messenger to the staff, and by the lapse of a weekly article to the "Fish Trades Gazette."

Items 5 and 22.—£87 is increase in D.W.R. postage and is met by increases under Item 22. £70 is increase in general postage beyond that of 1907–8 upon which the estimate is based. There is a general increase in Office business within the two years, 42 new stations, 515 radiotelegraphy registers, &c.

Item 10.—These payments are recovered in item 23.

Item 13.—Only eight months' accounts were rendered in the year, £123 may be allowed on that account.

Item 15.—The provision of £45 for international meetings was not claimed.

Item 16 and 26.—£107 13*s.* 9*d.* excess, with £74 8*s.* 6*d.* defect of Appropriation in Aid, and a reduction of charge owing to the lapse of a pension of £145 is explained by the fact that the expenditure bore the investment of the contribution for 1908–9, £337 13*s.* 9*d.*, under Minute 203, as well as the contribution for 1909–10, £351, which was effected on 4th March, 1910, in order to bring the expenditure within the year covered by the estimates.

Items 17, 18, 24, and 25.—The balance of cost to the Office, £530 4*s.* 11*d.*, includes increase of Office stock, £102 8*s.* 11*d.*, and outstanding accounts for instruments, £211 6*s.* 1*d.*

Items 19 and 20.—Includes two years' payment to Scottish Meteorological Society, each £95 10*s.*

Item 28.—The net expenditure includes two years' charges for superannuation investment so the net corrected charge on the year allowing for this item and for item 13 is about £90 under the estimate.

The payments reported in excess of the estimates were approved.

258. *Appointments.*—It was agreed to make the following appointments to date from 1st October, 1910 :—

(1) Superintendent of Forecast Division in accordance with Minute 240—Mr. R. G. K. Lempfert, M.A., at present Superintendent of Statistics.

(2) Superintendent of Statistical and Library Division, in accordance with regulations printed below—Mr. E. Gold, M.A., Fellow of St. John's College, Cambridge, at present Schuster Reader in Meteorology.

SUPERINTENDENT OF STATISTICS AND LIBRARY.

The duties of the Superintendent of the Statistics and Library division are to assist the Director in :—

(1) The arrangement, preparation and distribution of the British Meteorological Year Book and climatological reports ; the supervision of the stations contributing observations ; the arrangement and preparation of statistical summaries and publications based upon the records of observations.

(2) Researches in connection with meteorological statistics and their application to agriculture, hygiene, and public health.

(3) The organisation and arrangement of the Library.

(4) The exchange of publications with persons and institutions in this country and abroad.

(5) The supply of information in reply to inquiries from the Press and the public.

(6) The supervision of the members of the staff engaged in the work above mentioned.

(7) Such other duties as the Director may assign.

Hours.—Seven a day at the Office as directed.

Holidays.—Six weeks in addition to the usual public holidays.

Notice.—Twelve months on either side.

The Superintendent of Statistics may be transferred to the Forecast Division as Superintendent upon the terms set out in Minute 240 or to one of the other branches of the Office.

Facilities will be given for the Superintendent to undertake occasional lectures or to conduct independent researches in meteorology provided they do not interfere with his other duties. The Superintendent is not allowed to act as correspondent for a newspaper and the communication of information to the public or to the Press must be in accordance with the rules approved by the Director.

Salary £375—£12 10*s.*—£450, of which not less than £40 must be devoted to the purchase of an endowment assurance policy to mature at the age of 60 years.

(3) Special Assistant to the Director in accordance with Minute 111, with the additional duties of Secretary to the Director and Clerk of Publications for three years, with salary £275 rising by an annual increase of £12 10*s.*—Mr. R. Corless, M.A.

Schuster Readership (Minutes 88, 94).—Read—the following letter from Professor Schuster (M.O. 2,169) :—

Victoria Park,
Manchester,
26th June, 1910.

DEAR SHAW,

IT gives me much pleasure to renew the offer made three years ago to pay during the next three years an annual sum of £350 for the temporary endowment of a lecturer in Dynamical Meteorology. I have been much pleased with the success of the experiment and hope you will be able to find an equally good successor to Mr. Gold.

Yours truly,
ARTHUR SCHUSTER.

The Director
of the Meteorological Office.

It was agreed that the thanks of the Committee be given to Professor Schuster for his offer, and that Sir George Darwin and Mr. Middleton with the Director be a Committee to make the appointment in accordance with the regulations of Minute 94, with the omission of Regulation 8.

259. *Observatories* (Minute 248).—*Gassiot Committee.*—Reported—draft Minutes (C. 43) of the meeting of the Gassiot Committee on 15th June, 1910.

Kew Observatory.—Reported—that the direction of the observatory had been taken over as from 1st July ; that shortly before the close of the month the basement of the building had been flooded owing to the overflow of a cesspool in heavy rain and that the attention of the Office of Works had been called to the matter.

Eskdalemuir Observatory.—The Director reported that he had visited the observatory in company with Dr. Glazebrook on 13th–17th May, and had discussed on the spot with Mr. Oldrieve, representative of the Office of Works in Scotland, certain

alterations in the ventilation of the magnet house for which authority had subsequently been given at an estimated expense of £35 ; also an alteration of a disused coal cellar in the Superintendent's house at an estimated cost of £30, to provide an additional room ; also the provision of a lead lining for the floor of the photographic room, and other matters connected with the maintenance of the observatory.

Reported further—that a seismograph according to the design of Prince Boris Galitzin had been offered to the Laboratory by Professor Schuster and accepted. Provision was accordingly made during the Director's visit for the mounting of the instrument in anticipation of the visit of Prince Galitzin to superintend the installation of the apparatus. Prince Galitzin visited the observatory on 2nd July and it is expected that the installation will be completed under his superintendence by 7th July. The cost of erection in addition to the original cost of the apparatus, £150, will be borne by Professor Schuster.

The buildings at Eskdalemuir include a stable, but in view of the great distances from the stations (18 miles from Lockerbie, 15 miles from Langholm) it is suggested that a motor car is necessary.

Reported—the receipt from Dr. Glazebrook of a statement (M.O. 2,127) of expenses in connexion with the furnishing and equipment of the Observatory, as follows :—

Receipts.

1908 :—	£ s. d.	£ s. d.
Charged on Grant-in-Aid		461 11 11
Gassiot Fund		500 0 0
1909 :—		
Charged to General Laboratory Fund ...		749 2 10
Gassiot Fund		100 0 0
Government Grant ...	25 0 0 75 0 0	
		100 0 0
		£1,910 14 9

Expenditure.

1908 :—	£ s. d.	£ s. d.
Maple & Co.	472 1 4	
1909 :—		
Cumming (builder's work)	58 18 7	
Contribution to acetylene installation ...	350 0 0	
Expenditure on equipment 1908–10 :		
Tools, laboratory appliances, and apparatus, with cost of fitting. (*See* list M.O. 2,127) ...	929 14 10	
Do. do.	25 0 0	
Do. do.	42 19 10	
		1,878 14 7
Balance of Government Grant in hand ...		32 0 2
		£1,910 14 9

The current expenses exceeded the Grant of £1,000 in 1908 by £31 5*s.* 10*d.*, and exceeded the Grant of £1,000 in 1909 by £115 10*s.* 10*d.*, and the deficits have been met by the General Laboratory Fund. The deficit for 1909 is accounted for by the purchase of a large stock of carbide.

Submitted also—a statement (M.O. 2,353) by Dr. Glazebrook of the stock of coals, oil, and carbide amounting in all to £94 2*s.* 8*d.* of which £22 had been charged in the half years accounts to 30th June, 1910, while the rest, amounting to over £70, was paid in 1909. As there was a debit balance against the observatory which had been charged to the Laboratory General Fund, Dr. Glazebrook suggested that the Laboratory should be reimbursed for the stock of consumable stores on 30th June, to the extent of about £70. This suggestion would raise the whole question of accounts as between the National Physical Laboratory and the Meteorological Office, which has hitherto been avoided as involving complications. (*See* Memorandum D. 320 (C. 44).)

Another question arises as to the steps that should be taken with regard to the audit of the Eskdalemuir Accounts, in view of the fact that the grant-in-aid of the Observatory is made to the Royal Society.

It was agreed that these questions be referred for consideration to the Treasurer of the Royal Society in consultation with the Directors of the Office and of the National Physical Laboratory.

It was further agreed that it is desirable to carry out the alteration asked for in the Superintendent's house.

260. *Daily Weather Report.*—It was noted that no copy of the Daily Weather Report was sent to H.M. The King and it was agreed that steps be taken to ascertain whether His Majesty would be pleased to accept a copy.

261. *Director's Report and Accounts:—*

Publications.—The *Trade Winds of the Atlantic* (xvi.) has been sent for final revise.

The *Outline Charts for the Globe* (iv.) are in proof and have been fitted satisfactorily to the octagonal globe. They have now been made up into 14 sections in book form, and copies are to be obtained for the preparation of Monthly Charts of Mean Values. Copies of the whole series on one sheet on the scale of $1 : 8 \times 10^7$ have been ordered for the preparation of charts representing the data for the globe compiled by Mr. Lempfert for the Solar Commission.

Lectures.—On the invitation of the University of London Professor Bjerknes gave a lecture at University College on the "Dynamic Representation of Atmospheric Motions," at the close of which he urged the compilation for all observatories of hourly values strictly isochronous according to Greenwich Mean Time. The lecture is to be printed by the Royal Meteorological Society.

Captain Hepworth gave a lecture at the Royal Naval War College, Portsmouth, on 23rd June.

Papers and Discussions.—Mr. Gold has completed a paper on "The Determination of the Radiation of Air from Meteorological Observations"; also two sections of a report on meteorological work in accordance with Regulation 6 of Minute 94.

A copy of a paper published in the Philosophical Magazine has been received from Mr. J. Satterly on "The Amount of Radium Emanation in the lower regions of the atmosphere and its variation with the weather," which includes a number of maps of surface trajectories compiled in the Office.

A paper by Professor Grossmann on the result of experiments with regard to wireless weather telegrams from the North Atlantic Ocean from the "Annalen der Hydrographie und Maritimen Meteorologie" has been translated, so that it may be circulated.

The Director visited Eskdalemuir, 13th–17th May, to make arrangements connected with the transfer of the observatory; and Pyrton Hill on 22nd June in connexion with the work for the Advisory Committee for Aeronautics (Minute 229).

Reports of Work.—1. *Marine Branch.*—Data for South America, West Coast of England, and Nova Scotia in preparation for Admiralty. 59 meteorological logs, 2 short logs, 1 lighthouse register, 343 North Atlantic registers, 130 registers for radiotelegraphy, and 65 Indian Ocean register examined. Issue of the North Atlantic Meteorological Chart for June completed, July issue begun on 16th June. Extension of Indian Ocean Chart to 35° S.—data charted for May to September. (vii.) Preparing reproductions of Daily Weather Charts of the Antarctic Seas. The Charts for 1903 and January to July, 1902, are now passing through the press, and the reductions of August, 1902, and October, 1901, are well advanced. In the press 19 months, still to do 11 months.

The estimation of costs (at rates ordinarily charged) of work done for public offices, £12 10*s.*

2. *Forecast Branch.*—Daily Weather Report—Correction sheet for April, 1910, issued.

Weekly Weather Report—Remarks prepared to accompany Monthly Summaries for April and May.

Checking of 8.30 p.m. Forecasts completed to middle of April. The Summaries of Results for January, February, and March, 1910, are now submitted.

Wireless Telegrams—104 messages from Atlantic liners were received in May, and 385 messages in June. Observations plotted on working maps and isobars extended over Atlantic. Carbon copies of messages received from a large number of ships and compared with telegrams previously received. Notes respecting imperfections in reports prepared and handed over to Marine B anch.

Monthly Meteorological Charts of North Atlantic and Mediterranean. Daily maps prepared for publication on back of the weekly issues of the Charts. The maps are drawn from all available information, and show the conditions prevailing at 7 a.m. over Europe, North Africa, and the North Atlantic, and at 1 a.m., G.M.T., over a portion of the North American Continent.

(ix.) Isallobaric maps prepared daily for the two periods 7 a.m. to 6 p.m. and 6 p.m. to 7 a.m.

(*g.*) Gradient Wind Velocity—Information for the four stations, Valencia, Scilly, Dover, and Yarmouth, tabulated to end of April.

Harvest Forecast Service—The issue of daily harvest forecasts to subscribers for the 1910 season was commenced on 1st May, the subscribers being more numerous than in previous years. Subscribers for special notifications of spells of fine weather also show a considerable increase. The number of the two together to date is 107.

Storm Warnings.—Since 4th May warnings have been issued on 6 days, the total number of districts warned being 38.

In 9 districts the warnings were justified by subsequent gales (force 8 and upwards), and in 17 districts by subsequent strong or high winds. In 12 districts they were not required.

No gales were experienced without warning.

3. *Statistical and Library Branch.*—British Meteorological Year Book, Parts I., II., III., up to date. Usual work for library. Inquiries (May and June, 1910) as follows:—Newspapers, 22; Legal, 16; Scientific and Commercial, 69; Forecasts, 21; General, 13. The receipts in connexion with these amounted to £5 0*s.* 3*d.*

The estimate of cost (at rates ordinarily charged) of work done for public offices is as follows :—

	£	s.	d.
English Registrar-General	5	10	0
Irish „ „	0	17	6
	£6	7	6

4. *Instruments Branch.—Observatories.*—Preparation of Year Book, 1910, Part IV., for printer :—The printer has the whole of the copy for the month of May, and proof of the issue for Valencia has been received and passed for press.

The Hourly Rainfall Amounts (1871–1905) at the four Observatories have been dealt with by the formula $\frac{a + 2b + c}{4}$, and a smoother set of Hourly Means obtained.

The maximum and minimum temperatures shown by the curves of the thermograph at Falmouth during 1907–8–9 have been compared with the maximum and minimum for the same period registered by the instruments in a Stevenson's screen at the same place.

Teignmouth has been added to the list of stations sending up Sunshine Cards for examination and return each month.

The daily sunshine records from various stations are now being tabulated in order to show the diurnal variation of Sunshine in certain districts.

The examination of the Observatory returns, checking the measurements of Sunshine Cards, and tabulation of the Wind and Rain Curves, have been kept up to date.

The curves and tabulations received from the Observatories have been satisfactory.

Instruments.—The usual Admiralty and Office work.

The instruments at St. James' Park and the Churchyard have been examined and kept in order.

Instruments have been supplied against repayment as follows :—

Archibald Thom, Esq., Fortrose, N.B. ; G. Rossiter, Esq., Teignmouth ; Oundle School. Northampton ; A. Henderson Bishop, Esq., Lanarkshire ; W. E. Sotheby, Esq., Anglesey ; Scarborough District Council.

During May the Meteorological Office Exhibit was fitted up at the Japan-British Exhibition, and the instruments for the British Antartic Expedition were obtained for two land stations, and for use on board the S.S. " Terra Nova."

Nine boxes were sent out for the return of meteorographs.

Two requisitions have been received from the Crown Agents for the Colonies, and two from the Meteorological Department of the Transvaal.

Six requisitions are now in hand, two being partially completed.

Endowment Assurance Policies.—That endowment policies dating from 9th June, 1910, securing a fixed sum at the age of 60 years or previous death, had been taken out with the North British and Mercantile Insurance Office through the Civil Service Insurance Society for Messrs. A. E. Pycock, W. H. Parsons, and A. G. Goad. The amounts secured have been adjusted to take up the sums reserved from salaries in accordance with Minute 190, subject to the restrictions (1) that no policy is issued for less than £100 and (2) that fractions of a pound cannot be secured. The quarterly premiums payable on the first day of October under these policies are £1 7*s.* 5*d.*, £1 17*s.* 6*d.* and £2 9*s.* 11*d.* respectively.

The sums already reserved up to the 8th June have been added to the first payments representing premiums from 9th June to 30th September, 1910, and the sum assured increased accordingly.

The sums assured are :—

	£
Policy 133223 for Mr. A. E. Pycock	108
„ 133225 „ W. H. Parsons	199
„ 133224 „ A. G. Goad	343

Deferred Pay for Women Clerks.—Trustee accounts in the name of the Director have been opened with the Post Office Savings Bank dated 28th June, 1910, for the deferred pay for women clerks as follows :—Miss Anderson, £25 (£20 a year) ; Miss Smith, £15 (£20 a year) ; Miss Humphreys, £12 10*s.* (£10 a year) ; Miss Turney, £20 16*s.* 8*d.* (£10 a year) ; Miss Buckeridge, £12 10*s.* (£10 a year).

Accounts.—Submitted—The following statement :—

	£	s.	d.
Bank balance on 30th April, 1910	5,049	4	8
Receipts from 1st May to 30th June	940	10	8
	5,989	15	4
Cheques drawn from 1st May to 30th June	3,528	2	6
Bank balance on 30th June, 1910	2,461	12	10

Submitted—The following Statement of Accounts for the Quarter ending 30th June, 1910:—

RECEIPTS.						PAYMENTS.					
1909. £ s. d.		£ s. d.		1910. £ s. d.		1909. £ s. d.		£ s. d.		1910. £ s. d.	
2,327 10 4	Balance from year 1909–10	—		2,206 14 8		250 0 0	Director...	—		250 0 0	
3,975 0 0	Parliamentary vote..	—		4,187 10 0							
						1,715 14 4	OFFICE SALARIES: Monthly	1,876 7 1			
	DEPARTMENTAL EXPENSES REPAID:					131 7 5	Weekly	142 9 0			
45 9 9	Forecasts, &c. ...	52 6 0								2,018 16 1	
	Marine, Statistics, and Observatories					200 6 7	OFFICE EXPENSES: Rent, Fuel, &c. ...	185 11 2			
25 5 1		14 1 0				34 1 2	Furniture, Fittings, &c.	37 6 7			
11 2 1	Instruments ...	13 2 10				66 4 10	Incidental	88 10 10			
				79 9 10						311 8 7	
	INCIDENTAL EXPENSES REPAID:						POSTAGE AND TELEGRAMS:				
						63 9 6	General Postage ...	65 14 11			
77 0 8	Forecasts, &c. ...	73 14 4					Postage of Daily				
						78 10 0	Weather Reports ...	83 10 10			
21 14 10	Other Branches ...	31 16 2									
						543 6 8	Telegrams, &c. ...	530 11 6			
12 4 8	Stationery Office...	13 0 6								679 17 3	
				118 11 0		64 2 1	TRAVELLING EXPENSES AND INSPECTIONS...	—		62 11 5	
	TELEGRAPH CHARGES REPAID:										
						258 18 9	SUPERANNUATION ...	—		258 0 0	
64 15 1	Home	76 14 1									
	Telegrams sent						COST OF INSTRUMENTS:				
262 5 9	abroad	14 1 3				90 10 0	Royal Navy	142 1 7			
				90 15 4			Mercantile Marine,				
	INSTRUMENTS:					410 15 0	Stations, &c. ...	428 9 8			
388 19 6	Mercantile Marine, Stations, &c. ...	—		516 14 1						570 11 3	
							OBSERVATORIES:				
							Kew	1 1 0			
							Eskdalemuir	—			
	OBSERVATORIES, &C.:						Valencia	114 16 8			
—	Valencia	8 15 0					Allowances for other observatories, ob-				
—	Other items ...	12 5 0				760 10 4	servers, &c.	577 13 10			
				21 0 0						693 11 6	
	SUPERANNUATION ACCOUNT:					93 5 0	LECTURES AND EXPERIMENTS ...	—		140 18 5	
142 10 0	Annuities	141 5 0		—			ANTARCTIC METEOROLOGY	—		10 5 2	
	Interest on Invest-										
11 19 2	ment	14 10 4					BALANCE:				
				155 15 4		2,566 9 3	Cash at Bank... ...	2,461 12 10			
—	LECTURES AND EXPERIMENTS ...	—		137 3 2		38 6 0	,, at Office ...	41 0 11			
							Advance for Inspections	15 0 0			
										2,517 13 9	
£7,365 16 11				£7,513 13 5		£7,365 16 11				£7,513 13 5	

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
1,247 8 3	To sundry creditors	1,290 13 0		2,604 15 3	By cash at Bank and at Office ...	2,502 13 9	
337 13 9	,, superannuation, 1909–10 ...	—		115 10 0	,, Admiralty	167 1 7	
87 16 3	,, ,, ,, 1910–11 ...	77 6 3		127 7 3	,, sundry debtors (including advance for travelling expenses and pre-		
28 19 2	,, salaries reserved	—			payments for D.W.R.)	377 0 8	
1,260 3 7	,, balance	1,813 17 10		114 8 6	,, M.O. instruments in stock	135 1 1	
£2,962 1 0		3,181 17 1		£2,962 1 0		3,181 17 1	

NOTE.—On 30th June the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £2,761 1*s.* 3*d.*

THIRTY-SECOND MEETING.

South Kensington, London, S.W., 2nd November, 1910.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	CAPTAIN HARVEY.
SIR G. H. DARWIN.	MR. MIDDLETON.

REAR-ADMIRAL PUREY-CUST.

262. The Minutes (254–261) of the last Meeting (6th July, 1910), were read and confirmed.

Reported—the following proceedings at a Meeting of the Sub-Committee (Minute 256) on the 3rd August, 1910, at 63, Victoria Street, S.W. :—

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW. | CAPTAIN HARVEY.

1. Reported—estimated expenses in connexion with the removal to South Kensington :—

	£	*s.*	*d.*
Dilapidations at 63, Victoria Street	200	0	0
Cases for museum (per Office of Works)	178	8	9
Wall cases for ante-room (Sage)	98	10	0
Globe cases for museum (Sage)	37	10	0
Instruments for lobby and hall :—			
Callendar sun-recorder	71	16	6
Do. thermograph	51	10	0
Dines' anemograph	31	0	0
Flag pole and roof stands		?	
Tables and tools for laboratory and workshop (say)	50	0	0
Frames, &c. for staircase		?	

It was agreed to regard £855 of the balance standing to the credit of the Office on 31st March, 1910, as available for the items enumerated, as nearly as may be in the order set down.

2. *Date of Removal.*—In view of the letter, M.O. 1825, from the Office of Works approving the proposals for removal to be completed on 22nd October, it was agreed to arrange for the formal opening of the Office on Friday, November 18th.

3. *Kew and Eskdalemuir : Financial Arrangements.*—Reported—the decision of the Treasurer of the Royal Society (M.O. 3,044) as to the sums to be transferred between the Office and the National Physical Laboratory on the occasion of the transfer of the observatories to the control of the Office.

" Agreed—that all accounts paid by the National Physical Laboratory before July 1st, 1910, in " respect of Eskdalemuir Observatory should be charged against the Eskdalemuir grant up to " June 30th, and that any balance remaining on account of this grant when those accounts are paid " should be retained by the Laboratory in consideration for previous expenditure incurred by the " Laboratory in respect of the observatory.

" July 29th, 1910.

" A. B. KEMPE.
" R. T. GLAZEBROOK.
" W. N. SHAW."

4. *Student Assistant.*—Authority was given for the appointment of T. Carlton Sutton, B.Sc., of the University of Melbourne, Student Assistant since October, 1909 at the National Physical Laboratory, as Student Assistant to the Director from 1st October, 1910, at a salary of £60 a year, subject to one month's notice.

Reported—the following proceedings at an informal Meeting of the Committee held at the new Office at South Kensington, 19th October, 1910 :—

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW. | MR. MIDDLETON.

REAR-ADMIRAL PUREY-CUST.

1. *Lease.*—The Director reported an interview with Mr. Hapgood as to the terms of the lease of the new Office, in which he had raised the following questions :—

(i.) *Lift Attendant.*—The Office of Works propose to employ two men at an expense to the Office of £150 a year. As an alternative arrangement one man with hours of attendance 8.45 a.m. to 5 p.m. was considered, with the understanding that the use of the lift outside those hours would be by some member of the Office staff, who had received instructions in its use from the Engineer's Department.

(ii.) *The Roof.*—The inclusion in the lease of some reference to access to and use of the roof as being included in facilities granted to the Office by the lease.

(iii.) *Variation of Terms.*—In consideration of the dependence of the Committee upon the Treasury Grant, and the limitation of their tenure, it was suggested that power should be reserved to either side to terminate the lease by one year's notice with the consent of the Treasury, at any time after the conclusion of the first five years.

Mr. Hapgood, with whom was Mr. McFerran, head of the Engineering Department of the Office of Works, undertook to represent the views of the Committee to the Commissioners of Works.

2. *Assignment of Top Floor.*—Read, M.O. 3,221, from the Office of Works, as follows :—

SIR, 24th September, 1910.

I AM directed by the First Commissioner of His Majesty's Works, &c., to inform you that it is proposed to assign temporarily rooms on the top floor of the new building at South Kensington for the Post Office and the Meteorological Office to the Science Museum, and the Board understand from your recent conversation with Mr. Hapgood, of this Department, that this arrangement would meet with the concurrence of your Committee.

I am, &c.,
W. J. DOWNER.

It was agreed to return the following reply :—

SIR, 28th October, 1910.

IN reply to your letter 21,897-10 of the 24th September, I am to state on behalf of the Meteorological Committee that they have no objection to the proposed occupation of the third floor of this building by the Science Museum.

They note that the occupation is temporary.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Office of Works.

3. *Furnishing of New Office.*—The Committee inspected the building and the progress made in adapting the fittings of 63, Victoria Street, to the rooms of the premises.

Reported—that orders had been given for the cases and wall fittings for the museum and anteroom, the thermograph, sunshine recorder and anemograph for the hall and vestibule under authority of the Minute of August 3rd ; also that order had been given for two counter tops of mahogany for Room 25, at a cost of £18 19*s.* 6*d.*, from Mr. F. Restall.

Also—a relief map of a circle of 1,000 miles diameter to include the British Isles and a portion of Norway and France, on a scale of one-millionth, from Mr. H. F. Brion, to be delivered by 18th November, at a cost of £52 10*s.*

Also—twenty-four oak frames for diagrams, &c. for the staircase, and three stands for developable globes for the museum.

The order of four laboratory tables from Messrs. Maple & Co. was authorised.

4. *Kew Observatory.*—Read, M.O. 3,042 (printed below), from H.M. Treasury enclosing copy of the license to the Royal Society, dated 30th November, 1882, to occupy Kew Observatory, and asking the opinion of the Committee upon a proposal to transfer the license for the occupation of Kew to the Committee and to define the tenure with regard to Eskdalemuir by a similar license.

The Director was authorised to consult the officers of the Royal Society as to the method of regularising the relations between the Society, the Director, and the Office of Works.

5. *Forecast Branch.*—(i.) Read, M.O. 3,179, from the Post Office reporting that telegrams addressed to the Senior Naval Officer, Portland, at the request of the Admiral of the Home Fleet did not come within the terms of the understanding between the Admiralty, the Treasury, and the Post Office, dated 22nd February, 1910, providing for the despatch of service telegrams to the Fleet, although the Admiral's own messages were authorised.

It was agreed to ask the Admiralty to take steps to bring the telegrams within the terms of the understanding, as also those requested by telegraph from 'Vice-Admiral, "Bulwark,"' on September 12th, 1910.

(ii.) The Director reported that Mr. Brodie had requested to be relieved from early morning duty during the coming winter.

It was ruled that on general principles the regulations for the members of the forecast staff must be uniform, and an application for varying the terms of appointment could not be entertained except temporarily under circumstances of very special character.

(iii.) It was agreed that application be made for a grant from the Development Grant for the purpose of distributing forecasts by telegraph to all Postal Telegraph Offices in the United Kingdom for five years, in order that adequate trial might be made of the application of the forecasts in agriculture.

Read—M.O. 3,042 from the Treasury :—

16149/10.

Treasury Chambers,
8th September, 1910.

SIR,

WITH reference to previous correspondence on the subject of the transfer to the Meteorological Committee of the administration of the Observatories at Kew and Eskdalemuir I am directed by the Lords Commissioners of His Majesty's Treasury to transmit the enclosed copy of the Licence dated 30th November, 1882, under which Kew Observatory was occupied by the Royal Society. My Lords propose that a Licence in similar terms should, with His Majesty's permission, be granted to the Meteorological Committee.

In explanation of the terms of the Licence, it may be stated that the Commissioners of Works have carried out internal structural repairs as well as external repairs, and it is proposed that this arrangement should be continued, and that any internal repairs carried out by the Meteorological Committee should be executed by the Board's Contractors and under the supervision of the Board's Officers.

As regards Eskdalemuir Observatory, the buildings are vested in the Commissioners of Works, who bear the expense of all external and structural repairs, while the Royal Society was responsible for internal repairs and maintenance as well as for heating and lighting. There was no formal Agreement with the Royal Society,

My Lords are of opinion that an agreement on these terms should be entered into between the Commissioners of Works and the Meteorological Committee, and I am to inquire whether the Committee have any observations to offer on this proposal.

I am, &c.,
T. L. HEATH.

The Director,
Meteorological Office.

A LICENCE and AGREEMENT granted and made this Thirtieth day of November, One thousand eight hundred and eighty-two, Between the Commissioners of Her Majesty's Works and Public Buildings of the first part, The Queen's Most Excellent Majesty of the second part, and The President, Council, and Fellows of the Royal Society of London for the Promotion of Natural Knowledge hereinafter called or referred to as the said Royal Society of the third part.

WHEREAS the said Royal Society have for some time past by Her Majesty's permission occupied the Observatory in the Old Deer Park, Richmond, in the County of Surrey, for the purpose of carrying on Magnetic Meteorological and other scientific observations and experiments.

NOW the said Commissioners do hereby so far as they lawfully can or may on behalf of Her Majesty give licence and consent to the said Royal Society to continue in such occupation of the said Observatory for the purposes aforesaid but during Her Majesty's pleasure only, it being hereby declared and agreed that this licence may at any time hereafter be withdrawn and revoked by Her Majesty her heirs or successors or by the First Commissioner of Her Majesty's Works and Public Buildings or other the proper officer for the time being of Her Majesty her heirs or successors by writing under his or their hand or hands.

AND the said Royal Society hereby admit that they hold and have held the said Observatory only on the terms of this License and agree that they will henceforth during the continuance of this License pay to the said Commissioners or other the proper Officer or Officers aforesaid for the use of Her Majesty on the Twenty-fifth day of December in every year a sum of five shillings as an acknowledgment of Her Majesty's Title.

AND that they will not make any structural alterations in the said Observatory without the consent of the said Commissioners, And that they will keep the interior thereof in repair damage by fire tempest or other inevitable accident only excepted and will paint whitewash and paper the same once at least in every seven years during their occupancy.

AND the said Commissioners hereby declare that they will execute all necessary external works and that the said Royal Society shall not be responsible for any loss or damage by fire tempest or other inevitable accident that may occur in or to the said Observatory or to any of the goods and chattels of the said Commissioners therein.

IN WITNESS whereof the said Commissioners have hereunto affixed their Corporate Seal and the said Royal Society have affixed their Corporate Seal the day and year first above written.

Inrolled in the Office of Land Revenue Records
and Inrolments the 3rd day of April 1883.

(Sd.) H. J. HEWLETT,
Keeper of the Records.

Submitted—the following draft reply :—

Meteorological Office,
South Kensington, London, S.W.,
2nd November, 1910.

SIR,

IN reply to Sir T. L. Heath's letter of September 8th, I am desired by the Meteorological Committee to say that so far as they are concerned they would be prepared to accept the transfer of the license for the occupation of Kew Observatory now given to the Royal Society as being a natural consequence of the transfer of the financial responsibility for the maintenance of the Observatory and of the control of the staff from July 1st, 1910.

They are, however, of opinion that the close association between Kew and Eskdalemuir makes it desirable to keep the two observatories on a similar footing, and as regards Eskdalemuir there seems at present to be no ground for disturbing the present assignment of the use of the buildings to the Royal Society on conditions set out in the correspondence between the Office of Works and the Royal Society acting through the executive committee of the National Physical Laboratory,

In the present circumstances the Meteorological Committee has no financial responsibility as regards Eskdalemuir. The grant in aid of £1,000 is made to the Royal Society. The money is transferred by the Society to the Meteorological Committee to be spent on the maintenance of the Observatory under the direction of the Meteorological Office. Whether formally set out to be so or not the money is primarily intended to maintain the work of a magnetic observatory in lieu of Kew, and the ordinary funds of the Meteorological Office are appropriated to other objects. Under the direction of the National Physical Laboratory the Observatory took up meteorological work of which the Office had the advantage, but so far that work has been regarded as a necessary auxiliary to the magnetic observatory, not as a separate meteorological installation.

Looking to the future it is not improbable, considering that the Observatory is intended to be "secular" that the propriety of using it also for secular meteorological records may be put forward as a claim for subventions from the Meteorological Committee to provide for the necessary increase of staff, &c. That, however, would be a new and distinct step, which may be called for at any time but which has not yet been taken. In the meantime the Royal Society carries the residuary financial responsibility for the Observatory.

The Committee have received no direct information as to the views of the Royal Society with regard to the vesting of the right of occupation of the observatories in the Committee, but the course of the negotiations during the last year suggested that the Society as then advised would not willingly part with any control which it was in their power to exercise.

It is clear, however, that the position of the Director as administrator, in relation to the Office of Works as owners of the fabrics should be regularised and the Director has taken the view of the Royal Society as represented by the Gassiot Committee upon that point. It appears that the Director of the National Physical Laboratory has hitherto conducted the correspondence with the Office of Works on the authority of the Royal Society, and the Gassiot Committee recommended that the Director of the Meteorological Office act in like manner with the same authority.

The Secretary,
H.M. Treasury,
Treasury Chambers, S.W.

It was agreed to approve a proposal by Mr. Gold (M.O. 3,817) to take out an endowment assurance for £750 in the North British and Mercantile Insurance Co. in addition to the polices which he now holds, as complying with the condition of appointment under Minute 258.

263. *Programme of work for* 1911–12.—Submitted—the following :—

PROGRAMME OF WORK FOR 1911-12.

The equipment of the new office and rearrangement of the work under the new conditions should be completed by the close of the current year, but in many respects the arrangements will have to be provisional ; so that the organisation of the library, museum, laboratory, workshop and printing office will claim attention.

Little has been done as yet with regard to the co-ordination of the Office and Observatory staff. The peculiar conditions at Kew incidental to the joint occupation of the building by the Office and the National Physical Laboratory make effective co-ordination difficult. The practice prevails of using overtime not exclusively to meet unforeseen contingencies but as a regular supplement to the routine of the observatory, and the laboratory staff and observatory staff help one another out with overtime in a way that makes the application of any ordinary principles of organization inappropriate in this particular case. It is desirable that we should urge the speedy separation of the staffs. The building is not really adequate for the accommodation of the number of persons employed there. A report upon the sanitation has been asked for from the Office of Works in consequence of the flooding in the summer. It is very important that the Committee should take all reasonable precautions in that matter, and some action may be called for in the coming year.

No international meetings are at present contemplated in the year 1911-12. The recent meeting of the International Committee in Berlin (Minute 271) continued the Commissions for Weather Telegraphy and for Maritime Weather Signals in order that they might proceed further with questions affecting the alteration of the international telegraphic codes and the initiation of an international system of maritime weather signals with other questions relating to marine meteorology. The Director of the Office as president of these two commissions is responsible for conducting their business. As permanent commissions the membership must be enlarged to obtain more effective representation of the various interests concerned. Probably meetings should be held in the summer of 1912 and the business up to that date can be conducted by correspondence. It might, however, be necessary to call the Weather Signal Commission together.

A resolution of the Commission approved by the International Committee recommends a system for daylight use of international storm signals based on two cones. The adoption of this system, which has already received the assent of the Board of Trade, will necessitate the supply of an extra cone to each station. No scheme for night signals is yet approved, but a scheme consisting of three lanterns in the vertical is under consideration. It has the concurrence of the Board of Trade and the French Ministry of Marine. The whole question of the exhibition of storm signals in this country is thus brought to the consideration of the Committee.

A further duty in connexion with international meteorology falls to the office in consequence of a resolution of the International Committee asking the President to continue to give his assistance to the Solar Commission in promoting the compilation and publication of data for a selection of stations at the rate of two for a ten degree square, representing the meteorology of the globe, together with suitable magnetic and solar data. With this is associated the compilation of data for centres of action desired by the Commission du réseau mondial.

The International Committee on behalf of this second Commission asks for the assistance of the meteorological offices in providing a daily report by telegraph from a selection of their colonial stations in order that a conspectus of the meteorological conditions over the whole globe may be obtained from day to day. In a provisional list of about 40 stations the following are British possessions :—Dawson

City, a station in Newfoundland, a station in Upper Burmah, Kodaikanal, St. Helena, [Punta Arenas or] Falkland Isles, Mauritius, Pretoria or Cape Town, Alice Springs, Dunedin. The data asked for, in addition to the ordinary meteorological data, are intensity of insolation at fixed hours, the direction of motion of the upper clouds, and the temperature of the sea. The proposal in its present form is not easily realised, but it is the beginning of what may ultimately prove to be an acceptable addition to the procedure of weather forecasting. At present we have neither the observations nor the telegrams, but the matter will be kept in mind and information obtained as to cost and other details.

I.—Periodical Publications.

1. *The Monthly Marine Charts.*—The revised mode of issue of the *Atlantic Charts* has been the subject of favourable comment in the public press and elsewhere; it should be continued on the same lines. For the material for the western area of the daily charts of the stretch from the Ural Mountains to the Rocky Mountains we are dependent upon the information published in the Paris Bulletin. The Canadian Office is desirous of getting its own reports by telegraph from Europe for the corresponding purpose, and would gladly send a daily telegram reporting conditions on the western continent if arrangements could be made for its transmission. Taken in connexion with the proposition of the Commission du Réseau Mondial the extension of the telegraphic information by the inclusion of an exchange with Canada should be regarded as a step to be kept in view and realised as soon as funds permit.

The material for the *Indian Ocean Charts* will have been completed by the end of the current year, and we have undertaken to reconsider for the Stationery Office the form and size of the charts which are in some respects unsatisfactory. The prospect of conducting the lithography on our own premises points in the direction of reducing the scale of the chart and extending its area to the eastward so as to bring it to the same form as the Atlantic Charts. In so far as material fails for the time being for the eastward extension the space can be occupied by inset charts or letter-press.

2. *Daily Weather Report.*—A revision of the form of the Daily Weather Report is necessitated by the decision of the International Committee to recommend the omission from 1st May next of the wet bulb reading from the daily telegram and the substitution of the barometric change in the past three hours as recorded on a barogram. The occasion should be utilised to introduce the changes contemplated in two previous programmes (Minutes 173, 218) in consequence of the considerable addition that has been made recently to the area covered by observation and to the data to be published. There are two alternatives: one is to increase the size of the report in order to provide for the additional area with a revision of the scale, and to find room for the additional data. The other is to keep the report at its present size and to have one map for 7 a.m. displaying both pressure and temperature instead of two maps as at present. Provided that suitable means of representation can be devised, the latter is the better alternative because few readers of the report have the faculty of being able, by inspection, to incorporate the details of both maps. The arrangement of the maps for "yesterday" also requires consideration in connexion with the daily charts now prepared on the one hand for the weekly Atlantic issues and on the other hand for the Weekly Weather Report which are different.

Tables of mean values for 7 a.m. require to be prepared. The Daily Report at present puts forward 8 a.m. normals for comparison with 7 a.m. observations.

The arrangements for the issue of evening reports to the press will be revised in accordance with the suggestions put forward in the programme for 1909-10 (Minute 173).

3. *Statistical Reports.*—The arrears of the publication of observation at stations of the second order are now disposed of. Various questions come up for decision in connexion with the British Meteorological Year Book for 1911. As regards the Weekly Report, the form of the daily maps has already been mentioned. The question of the continuance of the computation of accumulated temperature was noted in the programme for 1910, as well as the number of stations for which daily values are printed. The continuance of the publication of hourly readings for the four observatories comes up for consideration in connexion with the publication of Colonial observations which has been contemplated for a long time and the incorporation of data for terrestrial magnetism, solar radiation and atmospheric electricity. Upon the three last mentioned points a recommendation is awaited from the Gassiot Committee.

As regards the Colonial observations the question arises as to co-operation with the Solar Physics Committee in regard to the data asked for by the Solar Commission. The

circular prepared at Toronto for issue to the Governments of British possessions requesting co-operation in the supply of data for a list of stations in the British Empire forming our contributions to the list of stations to represent the meteorology of the Globe is delayed on account of a request from the Director-General of Indian Observatories to circulate to the signatories certain comments on the proposal about which it seemed advisable to consult the Director of the Canadian Service on his recent visit to Europe. The matter will be pressed forward with as little delay as the circumstances permit.

4. *Investigation of the Upper Air.*—It is proposed to continue the work at Pyrton Hill in Mr. Dines's charge as heretofore, but a question of establishing a meteorological station at Farnborough under the control of the Office to carry out the meteorological observations and investigations necessary for the Balloon School was put forward by the Army Council. A scheme of operations has been drawn up. If action is taken upon this proposal the question of making the station thereby established the aerological centre for the Office will come up for consideration. Meanwhile the continuance of work done at Pyrton Hill under the control of the Director (for the Advisory Committee for Aeronautics) by Mr. J. S. Dines will come up for consideration by the Advisory Committee.

II.—Occasional Publications : Discussions and other Researches.

Of the 32 items set out in the programmes for 1909 and 1910 (Minutes 173, 218) as subjects for discussion or research as occasion may arise twenty remain uncompleted :—

1. Marine Branch.—(ii.) *Hurricanes.*—A synopsis of the information about the occurrence and paths of hurricanes in the Indian Ocean, the West Indies, the Bay of Bengal, the Western North Pacific, and, if possible, the South Pacific.

(iii.) Meteorological data of the *South Pacific Ocean.*

(iv.) *Outline Charts of Mean Values for the Oceans.*—These are in progress, and specimen charts will be exhibited in the Office museum.

(vi.) *Fishery Barometer Manual.*

(xxv.) Arrangement with the *Commonwealth Bureau* as to marine work.

(xxx.) *Local Winds.*

(xxxi.) *The Seaman's Handbook of Meteorology.*

The completion of (i.) the data for the Indian Ocean and of (vii.) the daily charts of the Antarctic for the years 1902–4 will set the staff of the Marine Branch free for other discussions.

The Hydrographer has asked for data as to currents in the Yellow Sea since 1896 in order to bring the current charts for that region up to date. It is proposed to combine with this the extraction of the meteorological data for the region referred to and thus to make a commencement of the discussion of the data for the Pacific Ocean.

2. Forecast Branch.—(viii.) *Forecast District Inquiry.*—A large compilation of data has been made for this inquiry, which proves to be very unwieldy. The data for one of the periods (January 8th to February 18th) have been put together by the Director, and tables of results for sunshine and rainfall prepared. The necessity for the inquiry becomes more and more urgent as the office forecasts come into more general use. Information of the kind which the inquiry would supply has been specially asked for by the "Glasgow Herald," and corresponding demands come from many quarters. Endeavour will be made to enlist the assistance of schools and other local agencies in bringing the inquiry to a satisfactory conclusion.

As regards item (ix.), *Isallobaric Charts*, the question may be discharged as a subject of special discussion, because, with the introduction of the barometric change into the Daily Report, recommended by the International Committee to commence with May 1st, 1911, it becomes part of the regular work of the Forecast Division. Charts of isallobaric changes have been drawn for the intervals—7 a.m. to 6 p.m., and 6 p.m. to 7 a.m.—for a long period. So far as a cursory examination of the results goes it appears that the extension in longitude of our map is too small for us to realise the full advantages which are claimed for the method by continental investigators accustomed to deal with the map of Europe as a whole. At the same time the barometric change in the three hours preceding the morning observation will be a very welcome addition to the information given in our daily reports.

3. Statistical Branch.—(x.) *The Seasons in the British Isles since 1878.* The work for this is still in progress. It may with advantage be combined with (xv.) *Summaries of Hourly Readings at the Four Observatories*, in a single publication.

(xii.) *The Sequence of Weather Changes at the Winter Quarters of the "Discovery."*

(xiv.) Questions in connexion with the British Association Committee on *Climate and Health.* Interest in these questions as treated by the statistical methods suitable for climatology is languid. It centres instead upon experimental questions such as the physiological effects of physical conditions which can be regulated by the experimenter. The Director prepared a paper on the climatic conditions associated with the outbreaks of influenza in the past 20 years which disclosed some definite results, but it has not yet been published.

4. Observatories and Instruments.—(xvii.) *Anemometric Comparisons.* (xxxii.) *Redetermination of Anemometer Constants.*—The contribution on Wind Structure to the Report of the Advisory Committee on Aeronautics to a certain extent deals with this item, but there is still room for a general discussion of anemometrical measurements, which would be particularly useful at the present time.

(xviii.) *Microbarograph Traces.*

(xxi.) *Barograph with 10-fold magnification*, for the new office.

(xxii.) *Design of rate of rainfall recorder*, for new office.

(xxvi.) *Tables for the Computation of Humidity from Wet and Dry Bulb Readings.*

(xxix.) *Notes on Instruments.*

Other Work.—(xxviii.) *The Computer's Handbook.*

(xxxiii.) *Lectures* in the University of London are to be given on the Climates of British Possessions. They will be published in book form by Messrs. Macmillan.

III.—Programme of Work at the Observatories.

Kew Observatory.

The ordinary work of the Observatory consists in maintaining in regular operation self-recording instruments for meteorology, terrestrial magnetism, atmospheric electricity and seismography, in meeting any requirements of the National Physical Laboratory as to testing instruments, instructing observers of various kinds, supplying photographic paper, and for other observations and generally contributing to the maintenance of uniformity and efficiency in the various institutions associated with Kew Observatory.

Meteorological work.—Self-recording apparatus with the usual control readings and tabulation of the curves as heretofore. Solar observations with Ångström pyrheliometer continued. Cloud observations with nephoscope according to international programme.

(CDCO 1) *Kew Pattern Barometers.*—It is proposed to examine the behaviour of the Kew Marine Barometer in comparison with the station barometer and to ascertain the degree of accuracy of the readings under conditions of varying pressures.

(CDCO 2) *Travelling Barometers.*—It is proposed to examine also the method of employing a hypsometer for the comparison of barometers to obviate the necessity for carrying a barometer on inspection journeys.

(CDCO 3) *Thermometry.*—Comparison of screens. The Superintendent writes: "Many observations have been made; comparatively little use has been made of the results. I should advise this research only if an occasion really exists at present, or is likely soon to exist, for determining how the results obtained at Kew at present compare with those taken with some other definite appliance and screen which either has been, or is likely to be used."

A Callendar electrical recorder will be available for the purpose if means can be found for recharging the batteries which are necessary for the instrument.

Terrestrial Magnetism.—Weekly absolute observations of declination, horizontal force and inclination.

Run the three magnetographs continuously.

Tabulation of declination and horizontal force curves on five selected quiet days a month according to the international (or the Greenwich) instructions. (*Question whether we break the existing arrangement with Greenwich and take the international days. This would probably delay the annual report.)

Preparation of table of mean annual values of magnetic elements at all the stations for which we have data (as in past years).

Continue tabulation, reduction and discussion of horizontal force and vertical force curves for the 11 year period 1890 to 1900. (We have discussed the "quiet" day and "disturbed" day diurnal inequalities for declination (D), horizontal force (H), and

* It is proposed to adopt the Greenwich quiet days for 1910, but in subsequent years to accept the choice made under international auspices at de Bilt.

vertical force (V) for this period, and also the D ordinary curves.) "I obtained a grant from the Government Grant Committee some years ago—now approaching exhaustion—and up till now the work has been mainly done as special overtime. The actual curve measurements are mainly done, but a great amount of arithmetical computation remains to be done, and I shall now have to give close personal consideration to the data. The lunar diurnal irregularity for the different elements should also be got out, but I have not as yet done any such work and do not know its difficulties."

Atmospheric Electricity.—Assuming we proceed as approved at the June meeting, we shall have to make hourly tabulations (mean hourly values from half-hour before to half-hour after exact hours G.M.T.) of the potential gradient curves whenever feasible, and not merely as heretofore on ten days a month. (This means a large increase in tabulation work, especially as the quiet curves hitherto selected should be relatively easy to measure.)

Absolute measurements of potential gradient, to standardise curves, would be continued.

If we got an Ebert apparatus, observations with it and the present Wilson apparatus would naturally be taken daily in good weather (in place of the present use of the Elster and Geitel apparatus).

If a suitable electrometer is provided, a preliminary series of experiments had desirably be made with the flat insulated plate and guard ring suggested by Mr. Wilson.

Seismometry.—Run the existing Milne seismograph and prepare tables of tremors for publication in annual report, and transmission half-yearly to Professor Milne.

Other investigations will be undertaken if time allows.

Eskdalemuir Observatory.

The Committee is already aware that the general meteorological instruments are in regular working order and that systematic tabulation of the results has gone on during this year. The continuance of this work may therefore for the moment be considered as presenting no difficulty. A wind direction recorder and thermometers for earth temperatures are still required.

The Superintendent reports :—

> "The most important step in the new year is the commencement of regular tabulation of the magnetic records. A memorandum on the whole of the magnetic work has been prepared for the Sub-Committee on Magnetics, and their opinion will be laid before the general Committee.
>
> "In Seismology the Milne recorder is in regular working order and tabulation on the British Association forms is carried on. The tabulation cannot be made a purely mechanical progress, and frequently cases occur requiring special consideration. The Wiechert Seismograph has been in use from time to time, but with somewhat unsatisfactory results. A memorandum has been prepared asking for a decision as to whether the use of the instrument ought to be continued.
>
> "The addition of the Galitzin Seismograph will mean a large addition to the work when systematic tabulation and examination of the records begin. An ordinary assistant would be quite incapable of doing this. The analysis of a record requires expert knowledge of physics and mathematics."

The proposal to add to the equipment an Omori Seismograph for two years for the purpose of comparison with the other instruments makes the provision for scientific study of the seismological records still more urgent.

In atmospheric electricity we are in a position to start regular tabulation of the electrograph records. A number of experiments have been made this year with regard to possible sources of error, and it is highly desirable to continue these in the future. Attention must be given in the problem to the fact that it is not a question of pure electrostatics, but involves the problem of ionic conductivity in the air. The use of Ebert's apparatus is thus necessary, and other methods of experimenting will be required.

It is desirable to call attention to the large amount of work involved in tabulating the records of so many instruments. The mere overtime work seems more than enough for two assistants, while the proper examination of the Galitzin records, and special phenomena in the magnetic, meteorological and electrical records, seems to call for the co-operation of trained physicists.

Valencia Observatory.

The work at this Observatory consists in the maintenance of a First Order Station and a Telegraphic Station, together with special observations on clouds for the International Commission for Scientific Aeronautics, and magnetic observations for Lord Rosse's Trust.

The staff consists of a Superintendent and an assistant. No change is contemplated in the year 1911.

IV.—Schuster Readership.

The appointment of a successor to Mr. Gold as Schuster Reader in dynamical meteorology is not yet made.

Forecast Branch.—It was agreed to print and circulate the following letter applying for a grant from the Development Commission (*see* Minutes for October 19th, 1910, Minute 262) :—

The Meteorological Committee beg leave to make application to the Development Commission for a grant of £5,000 a year for five years from the Development Grant in order that a daily forecast of weather, transmitted by telegraph, may be exhibited at all postal-telegraph offices in the United Kingdom.

The sum asked for will be wholly expended in defraying the charges made by the Post Office for transmitting the messages by telegraph. Provision has been made already for the preparation of the forecasts and authority has already been given by the Postmaster-General for the exhibition of the telegrams at the post offices if space allows. Provision for the cost of transmitting the messages alone is wanting to complete the organisation.

The application is made on the grounds—

(i) that trustworthy information as to the weather prospects for the ensuing 24 hours would be of material benefit to agricultural communities as well as to fishing communities and longshoremen ;

(ii) that the forecasts issued by the Meteorological Office are sufficiently trustworthy for the purpose.

The system of daily forecasts of weather by means of synoptic charts based upon telegraphic reports which was developed in Europe and America between 1860 and 1880 has been adopted by nearly all civilised countries.

The work divides itself into two parts—(i) the preparation, (ii) the distribution of the forecasts. The preparation of the forecasts is conducted upon a similar system all over the world, but as regards the distribution there is no such unanimity. In some countries, as in the United States, Germany and Denmark, the distribution of the forecasts is regarded as an essential part of the public organisation : in others the distribution is left to private enterprise at private cost.

The United Kingdom belongs to the latter category. It is provided that any person or public body can have forecasts sent by telegram upon defraying the cost of the telegrams with the addition in certain cases of an office fee. Upon this system forecasts have been offered to farmers and others during the harvest season, and a number of persons have availed themselves of the offer—as many as 120 in the past summer.

Forecasts prepared in the evening are also issued without charge to newspapers, and appear in nearly all morning newspapers ; but by this method of distribution the information takes 12 hours to reach the readers, and it fails to reach those who, for the reason of distance or otherwise, do not take a daily paper.

By the proposal of the Committee the information would be at all village post offices within an hour of its issue from the Office and practically by repetition within reach of everybody in a few hours.

The chief reason for urging a trial of this mode of distribution for a period of five years as compared with distribution by private enterprise is that weather forecasts are a novelty to the use of which farmers and others have to become accustomed in order that they may use them effectively. With their use there ought to be associated a suitable course of Weather Study in rural schools.

Many persons are ignorant of what a forecast really is. Supposing that the knowledge of to-morrow's weather at the command of the forecaster were complete he would find some difficulty in setting it out in the few words allowed for a telegraphic forecast, and in many cases incompleteness is represented either by indefiniteness as to the time of occurrence or the intensity of the weather conditions. A farmer getting a forecast for the first time describing to-morrow's weather in twelve words is quite uncertain what to do with it. Consciously or unconsciously he has his own traditional mode of estimating the coming weather, and he must refer thereto the anticipations of the forecast. If the forecast agrees with his own ideas it may be regarded as unnecessary; if it does not agree it requires a good deal of courage to act upon it against his own convictions. No doubt if the forecast were always rigorously accurate a few experiences would convince him of the reality of forecasting, but we have to deal with about 60 per cent. of complete successes and an additional 30 per cent. of partial successes with 10 per cent. of failures partial or total.

To get the 90 per cent. of advantage we must have the hundred occasions. If the system is to be judged by isolated instances selected by the recipient, no statistics are applicable, the result is practically fortuitous.

The issue of forecasts has now been made regularly since 1882, and it may fairly be said that an ample trial has been given to the method of preparation of forecasts. It is time that an effective trial be given to the distribution of forecasts, and on that ground the Meteorological Committee beg leave to base their application.

264. *Publications.*—Submitted—the following :—

RETURN of PUBLICATIONS issued by the METEOROLOGICAL COMMITTEE during the financial year 1909–10, showing in each case the cost of PRINTING, &c., and the AMOUNTS RECOVERED by SALES during the year.

1908–09.		Publication.	1909–10.	
Cost of Printing and Paper.	Sales through Stationery Office Agents.		Cost of Printing and Paper.	Sales through Stationery Office Agents.
£ s. d.	£ s. d.		£ s. d.	£ s. d.
456 17 5	—	Daily Weather Report	473 9 10	—
406 11 10	46 3 0	Weekly Weather Report (including Monthly Summaries).	457 4 5	39 3 0
70 19 0	—	Weekly Weather Report, Appendices to.	64 16 10	—
143 18 3	7 1 4	Monthly Pilot Charts (Indian Ocean)	141 4 9	9 16 4
208 17 5	14 0 0	„ „ „ (North Atlantic, and Mediterranean).	206 16 3	13 13 4
235 17 8	—	Hourly Readings	171 11 9	—
72 15 0*	6 17 11	Annual Report, 1907–8	—	—
—	—	„ „ 1908–9	67 3 8†	7 18 8
165 16 7	3 0 0	Stations of the Second Order, 1904	—	—
—	—	„ „ „ 1905	162 1 0	2 5 0
—	—	„ „ „ 1906	120 10 5	2 6 8
131 19 9	—	„ „ „ 1908	—	—
—	—	„ „ „ 1909	111 12 1	—
40 6 2	1 13 4	Barometric Gradient and Wind Force.	—	—
—	—	Barometer Manual for the use of Seamen.	89 16 9	17 19 8
—	—	Free Atmosphere in the region of the British Isles.	38 9 2	1 13 4
20 12 4	0 10 0	International Meteorological Committee—Reports.	17 16 7	—
33 16 0	0 13 4	International Meteorological Conference at Innsbruck.	—	—
—	—	Codex of Resolutions adopted at International Meteorological Meetings.	18 14 1	2 10 10
38 13 7	—	Meteorological Log (Form 131) ...	37 11 2	—
—	—	Minutes of Proceedings of Meteorological Committee, 1908–9.	31 9 5	—
52 1 2	15 16 0	Observer's Handbook	57 19 2	20 4 0
—	—	Wireless Telegrams from Liners—Report.	2 5 10	—
2,079 2 2‡	95 14 11		2,270 13 2**	117 10 10
	5 16 9	Miscellaneous Sales of earlier Publications.		11 3 8
	58 13 9	Sales by Meteorological Office ...		54 16 0
	160 5 5			183 10 6

* This amount includes the sum of £25 2*s.* 1*d.*, the cost of copies supplied to the Meteorological Office on repayment.
† This amount includes the sum of £25 2*s.*, the cost of copies supplied to the Meteorological Office on repayment.
‡ This amount includes the sum of £1,758. the cost of the Official Publications supplied to the Meteorological Office for Departmental use. &c., during 1908–9.
** This amount includes the sum of £1,819, the cost of the Official Publications supplied to the Meteorological Office for Departmental use, &c., during 1910.

STATEMENT showing the EXPENDITURE by H.M. STATIONERY OFFICE for PRINTING, STATIONERY, &C., for the METEOROLOGICAL OFFICE.

——	Printing.	Paper.	Binding.	Books.	Stores.	Total.
	£	£	£	£	£	£
1909–10	2,017*	315*	139*	13	22	2,506*
1908–9	1,575*	256*	155*	11	23	2,020*

* These amounts include the cost of the copies of Official Publications supplied for Departmental purposes.

Submitted—the following :—

PROGRAMME OF PUBLICATIONS FOR 1911–12.

Periodical:—Daily Weather Report. (700 to 750.)

Meteorological Charts of the Atlantic Ocean. (600 + 150.)

Do. do. Indian Ocean. (350 + 200.)

British Meteorological Year-book, 1911.

Part I.—Weekly Weather Report. (375 + 75.)
Quarterly and Annual Appendices. (375 + 75.)
Quinquennial Appendices. (600.)

Part II.—Monthly Report Supplement. Monthly and Annual Summaries. (500 + 100.)

Part III.—Observations at Stations of the Second Order and Anemograph Stations. (250.)

Part IV.—Hourly Readings and other data for the Observatories. (250.)

Part V.—Climatological Report for the British Empire. (500.)

Observer's Handbook, 1911 Edition. (100.)

Occasional:—Report of the Ninth Meeting of the International Meteorological Committee, Berlin, September 26–29, 1910. (250.)

Revised Editions of the Monthly Outline Sheets for charting tracks and noon values. (500.)

Atlas of Tropical Hurricanes. (500 + ?.)

Seasons in the British Isles, with Normals for the four Observatories. (500 + ?.)

Computer's Handbook. (500.)

Seaman's Handbook of Meteorology. (500.)

Fisherman's Handbook. (500 + 2000.)

Submitted—the following letter :—

1, Adelphi Terrace,
London, W.C.,
21st October, 1910.

MY DEAR SIR,

THE suggestion has been made that your publications which are issued and for sale might with advantage be offered to the general public through a book-publishing firm. Of course I recognise that to some extent they are in the form of guide-books, lists, and catalogues, but yet they must be of general interest to a large public, and there must be many visitors or others who would like to obtain copies and are not able to do so.

I wonder if I can be of any service in this matter? I need hardly say, as a publisher, it will give me great pleasure to be identified with the publication of your works, and if you will give me the opportunity of discussing the subject with you or corresponding, I shall be happy to meet your wishes, if convenient, by an appointment.

I am sending you some recent lists and catalogues to show you what we have done as publishers.

Thanking you in anticipation of your kind consideration of this matter.

Yours very truly,
T. FISHER UNWIN.

W. N. Shaw, Esq., LL.D., F.R.S., Sc.D.,
Meteorological Office.

It was agreed to consult the Stationery Office upon the matter.

Read also—the following letter :—

44, Bedford Row, London,
21st October, 1910.

THE UNIVERSITY OF LONDON PRESS.

DEAR SIR,

THE Press is considering a scheme for publishing the series of the University Advanced Lectures, subject to the approval of the University. Would you be willing to grant us the right of publishing those to be delivered by yourself?

Yours faithfully,
WM. MOXON-BROWNE,
Manager.

W. N. Shaw, Esq., LL.D., &c.

265. *Gassiot Committee* (Minute 259).—Reported—that a meeting of the Gassiot Committee had been held on 28th October for the preliminary consideration of the programme of work for the observatories as set out in Minute 266, but that no final conclusion was arrived at.

Dr. Chree, Assistant-Director of Observatories, attended the meeting by invitation of the Director to discuss the estimates for the observatories for the ensuing financial year (M.O. 3629).

266. *Estimates for* 1911–12.—Reported—M.O. 3391 from the Treasury, asking for the usual estimate of expenses of the Meteorological Office for 1911–12 to be sent in not later than 1st December.

Submitted—the following first draft of estimates for the year 1911–12.

METEOROLOGICAL OFFICE.
ESTIMATES for the Year 1911–12.

Heads of Service.	Proposed for 1911–12.	Voted for 1910–11.	1911–12.	
			Increase.	Decrease.
	£	£	£	£
Director	1,000	1,000	—	—
Office salaries	8,179	7,933	246	—
Observatories	3,112*	2,306	806	—
Office expenses :				
Rent, fuel and lighting	765	725	40	—
Repairs, furniture, and incidental expenses	360	410	—	50
Postage	600	500	100	—
Telegrams	2,425	2,505	—	80
Travelling expenses and inspections	320	340	—	20
Superannuation allowances (operative) ...	1,208	1,058	150	—
„ fund	428*	718	—	290
Cost of instruments	2,300	1,600	700	—
Allowances for auxiliary observatories, observers, &c.	2,760	2,987	—	227
Totals	23,457	22,082	2,042	667
Appropriations in aid :				
Observatories	1,862	1,369	493	—
Departmental expenses refunded	395	445	—	50
Incidental expenses refunded	550	490	60	—
Telegraph expenses refunded	610	620	—	10
Cost of instruments refunded (Navy) ...	510	500	10	—
„ „ „ (other sources)	1,490	800	690	—
Superannuation	780	708	72	—
Lectures and experiments	410	400	10	—
Parliamentary Grant	16,850	16,750	100	—
Totals	23,457	22,082	1,435	60

* Altered by Minute 275 to £8,279 and £328.

Submitted the following :—

METEOROLOGICAL OFFICE.

STATEMENT of CHARGES upon the GRANT for 1911-12 REQUIRED for WORK SANCTIONED in the CURRENT YEAR.

(Normal Increases of Salaries are included.)

—	Administration.		Lectures and Experiments.		Inspections.		I.—Marine.		II.—Forecasts and Storm Warnings.		III.—Statistics, Library and Climatology.		IV.—Instruments and Observatories.		No.	Total.	
	£	£	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Office Salaries.																	
Director ... £1,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,000
Superintendents and special assistant	...	...	...	335	...	...	...	450	...	400	...	375	...	363	6	1,923	...
Clerks :—																	
Cashier and other Staff Clerks	...	(4) 650	...	...	...	...	...	(6) 935	...	(8) 1,600	...	(5) 885	...	(4) 645	27	4,715	...
Clerk Assistant	...	...	...	...	...	...	...	...	...	...	...	(1) 90	...	(1) 75	2	165	...
Supernumerary Clerks	...	...	...	...	...	...	...	...	...	(1) 61	...	(1) 75	...	...	2	136	...
Probationers and Boy Clerks	...	...	...	...	...	...	...	(1) 40	...	...	...	...	...	(2) 100	3	140	...
Female Clerks	...	(1) 100	...	(1) 95	...	...	...	(3) 290	...	...	...	...	...	...	5	485	...
Office Keepers	(2) 190	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...
Cleaners	(4) 120	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...
Messengers	(5) 241	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...
		551	...	...	...	...	...	...	...	...	...	...	...	...	...	551	...
Allowance for Revision	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ „ Overtime Work, &c. ... 64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	64	...
																	8,179†
Office Expenses.																	
Rent Fuel, and Lighting :—																	
Rent	640	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fuel	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lighting	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lift	75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		765	...	...	...	...	...	...	...	...	...	...	...	...	...	765	...
Repairs and Furniture	...	50	...	...	...	...	...	...	...	...	...	...	...	...	...	50	...
Incidental Expenses and Contingencies (Exclusive of Postage) :—																	
Carriage of Parcels	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Books and Printing (inclusive of S.O.P.)	120	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Office-Keeper Contingencies	75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Telephones, &c.	100	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		310	...	...	...	...	...	...	...	...	...	...	...	...	...	310	...
																	1,125
Postage and Telegrams.																	
Postage	...	270	...	...	...	...	...	...	...	330	...	...	...	...	...	600	...
Telegrams from Inland Stations and H.M. Ships.	...	...	...	...	...	...	...	...	550	...	...	...	...	...	...	...	...
„ from Mercantile Marine	...	...	...	...	...	...	...	...	350	...	...	...	...	...	...	...	...
„ from Abroad	...	...	...	...	...	...	...	...	370	...	...	...	...	...	...	...	...
„ sent Abroad	...	...	...	...	...	...	...	...	500	...	...	...	...	...	...	...	...
„ Storm Warnings	...	...	...	...	...	...	...	...	300	...	...	...	...	...	...	...	...
„ Hay Harvest Forecasts	...	...	...	...	...	...	...	...	85	...	...	...	...	...	...	...	...
„ Sundries, Forecasts, &c.	...	...	...	...	...	...	...	...	90	...	...	...	...	...	...	...	...
Allowances to Clerks	...	...	...	...	...	...	...	...	150	...	...	...	...	...	...	...	...
Private Wires	...	...	...	...	...	...	...	...	30	...	...	...	...	...	...	...	...
										2,425	...	...	...	...	...	2,425	...
																	3,025
Travelling Expenses.																	
Committee, &c.	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Representatives at International Meetings	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Inspectors, M.O.	...	...	...	...	120	...	...	...	...	...	...	...	...	...	...	...	...
„ Kew	...	...	...	...	60	...	...	...	...	...	...	...	...	...	...	...	...
„ Scottish	...	...	...	...	50	...	...	...	...	...	...	...	...	...	...	...	...
Inspections, Royal Meteorological Society	...	...	...	...	25	...	...	...	...	...	...	...	...	...	...	...	...
		65	...	...		255	...	...	...	...	...	...	...	...	...	...	320
Carried forward ... £1,064	...	2,761	...	430	...	255	...	1,715	...	4,816	...	1,425	...	1,183	...	...	13,649

	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Brought forward £1,064	...	2,761	...	430	...	255	...	1,715	...	4,816	...	1,425	...	1,183	...	...	13,649
Superannuation.																	
Mr. Scott	400	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Annuities	150	...	...	...	...	...	300	...	150	...	...	...	...	...	...	...	...
Mr. Francis	...	...	...	...	...	...	...	...	75	...	...	...	...	...	...	...	...
Mr. Call	..	...	...	...	...	...	...	...	...	...	...	...	59	...	...	...	...
Mr. Allen	74		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		624	...	...	...	...		300		225	...	...		59	8	1,208	...
Contribution for Superannuation of Clerks	...	428	...	...	...	...	...	...	...	...	...	...	...	...	...	428	...
																	1,636†
Cost of Instruments.																	
Royal Navy	...	...	...	...	...	...	...	...	...	...	...	...	510	...	...	...	...
For Office use	...	...	...	...	...	...	...	...	...	...	...	...	300	...	...	...	...
Other Commissions	...	...	...	...	...	...	...	...	...	...	...	...	1,490	...	...	...	...
														2,300	...	...	2,300
Observatories, Kew, Eskdalemuir, Valencia (*see* next page).	...	...	...	...	...	...	...	...	...	...	...	...	...	3,112	...	...	3,112
Allowances for other Observatories Observers, &c.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Aberdeen Observatory	...	...	...	...	...	...	...	...	...	...	...	...	295	...	...	...	...
Armagh do.	...	...	...	...	...	...	...	...	...	...	...	...	50	...	...	...	...
Falmouth do.	...	...	...	...	...	...	...	...	...	...	...	...	250	...	...	...	...
Glasgow do.	...	...	...	...	...	...	...	...	...	...	...	...	75	...	...	...	...
Stonyhurst do.	...	...	...	...	...	...	...	...	...	...	...	...	56	...	...	...	...
Anemograph Stations (including St. Helena)	...	...	...	...	...	...	...	...	...	...	...	...	(7) 74	...	7	...	...
														800	...	800	...
Incidental Expenses, Forms, &c.	...	...	...	...	...	...	...	...	...	...	...	...	...	120	...	120	...
Reporters at Telegraphic Stations	...	...	...	...	...	...	...	...	...	600	...	...	...	...	27	600	...
Investigation of Upper Air :—																	
Director of Experiments	...	...	200	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mechanical Assistant	...	...	130	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Contribution for International Publication	...	...	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Contingencies, Incidental Expenses	...	...	120	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meteorological Societies :—				500	...	...	...	...	...	...	...	...	...	...	...	500	...
Second Order Stations	...	...	...	...	...	...	...	...	...	...	150	...	...	...	...	...	...
Weekly Reports	...	...	...	...	...	...	...	...	...	...	50	...	...	...	...	...	...
British Rainfall	...	...	...	...	...	...	...	...	...	...	14	...	...	...	...	...	...
Salary of Scottish Inspector	...	...	...	...	50	...	...	...	...	...	...	...	...	...	1	...	...
						50	...	...	...	...		214	...	...	...	264	...
Schuster Reader	...	...	...	350	...	...	...	...	...	...	...	...	...	...	1	350	...
Agents' Fees (Marine)...	...	...	...	...	...	...	...	95	...	...	...	...	...	...	...	95	...
Presentation Labels	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	6	...
Lectures, &c.	...	...	...	25	...	...	...	...	...	...	...	...	...	...	...	25	...
																	2,760
Totals (*Dr.*) £1,064	...	3,813	...	1,305	...	305	...	2,116	...	5,641	...	1,639	...	7,574	...	...	23,457
Appropriations in Aid.																	
Observatories (*see* next page)...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,862	...	1,862	...
Departmental Expenses refunded	5	...	...	...	...	...	5	...	175	...	65	...	145	...	...	395	...
Incidental Expenses refunded (including S.O.P.)... ...	75	...	...	...	...	...	...	...	400	...	...	...	75	...	...	550	...
														220	...	...	...
Telegraph Charges, &c., refunded	...	...	...	...	...	...	...	...	610	...	...	...	...	...	...	610	...
Cost of Instruments, &c., refunded—Navy	...	...	...	...	...	...	...	...	...	...	...	...	510	...	...	...	...
" " " Other Sources ...	...	...	...	...	...	...	...	...	...	...	...	...	1,490	...	...	...	...
Superannuation :—														2,000	...	2,000	...
Annuity Receipts, &c.	330*	...	...	...	...	...	300	...	150*	...	...	...	...	...	...	780	...
Lectures and experiments	...	...	410	...	...	...	...	...	...	...	...	...	...	...	...	410	...
Totals (*Cr.*)	...	410	...	410	...	...	...	305	...	1,335	...	65	...	4,082	...	...	6,607*
NET TOTALS £1,064	...	3,403	...	895	...	305	...	1,811	...	4,306	...	1,574	...	3,492	...	...	16,850
Parliamentary Grant	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	16,850

* Two pensions of £74 and £75 respectively are set against the receipt of £150 annuity provided for a pension deferred.

† Altered by Minute 275.

METEOROLOGICAL OFFICE.

OBSERVATORIES.

ESTIMATED CHARGES upon the GRANT for the MAINTENANCE of the OBSERVATORIES at KEW (Central Observatory), ESKDALEMUIR (Magnetic Observatory), and VALENCIA (Western Observatory), during the year 1911–12.

(Normal increases of salaries are included.)

	£ s.	£	£
KEW (Central Observatory).			
Superintendent	—	657	
Assistants :—Boxall	150 0		
Francis	145 0		
Harris	52 0		
Levin	41 12		
Caretaker and Observer—Corrin	71 10		
		460	
Sundays and Holidays	15 0		
Overtime	37 0		
		52	
Rent, Fuel and Lighting		122	
Repairs		70	
Insurances		16	
Materials		20	
New Instruments*		50	
Books, Printing and Stationery		52	
Incidental Expenses		40	
Allowance for revision		61	
			1,600
ESKDALEMUIR (Magnetic Observatory).			
Superintendent	—	400	
Assistants :—Gendle	142 10		
Parkinson	100 0		
		243	
Mechanic and Caretaker—Black		109	
Handy man—Laidlaw		52	
Incidental expenses		196	
			1,000
VALENCIA (Western Observatory).			
Superintendent		287	
Assistants :—Sugrue	82 0		
Sullivan	39 0		
		121	
Incidental expenses		104	
			512
TOTAL—Kew, Eskdalemuir and Valencia ...			3,112
APPROPRIATIONS IN AID.			
KEW.	£ s.	£	£
Gassiot Fund	450 0		
National Physical Laboratory	375 0		
Grazing rent	5 0		
Miscellaneous	20 0		
		850	
ESKDALEMUIR.			
Royal Society		1,000	
VALENCIA.			
Interest on Trust Fund for Magnetic Observations ...		12	
			1,862
Net estimated charge			1,250

* Ebert instrument, 421 Marks.

267. *Audit of Accounts for* 1909–10.—Reported—that the accounts for 1909–10 had been accepted by the Exchequer and Audit Department without remark.

268. *New Office* (Minutes 256, 262).—(i.) *Lease.*—Reported—the receipt from the Solicitor's Department of a draft of the lease, revised to meet representations of the Director set out in Minute 262.

The draft was approved, and, subject to the approval of the Treasury, it was agreed to authorise its execution by the Trustees.

(ii.) *Staircase.*—Read—M.O. 3,600 from Sir Henry Tanner asking that a deal glass case which had been in use at Victoria Street for preserving instruments of historic interest should not be placed on the landing, on the ground of its projecting 2 feet, and "not agreeing with the original fittings, upon which a good deal of money and trouble have been expended."

Also—in reply D 467 explaining that the standard of decoration of the landing was beyond what was customary in the Meteorological Office, and undertaking to submit to the Committee a design of cases on either side of the folding doors to contain historical instruments and the recording gear of the instruments exposed on the roof.

(iii.) *Library.*—An order for a cabinet of five tiers with cupboard base for a card index catalogue of the Library according to Authors at a cost of £13 10*s.* and a corresponding cabinet for the subject catalogue in lieu of the present 4-drawer section at an estimated cost of £11 17*s.* was approved.

(iv.) *At Home.*—It was agreed that invitations should be sent out for an afternoon party on 1st December, 1910, in lieu of 18th November, as previously arranged.

269. *Observatories* (Minutes 259, 262).—It was agreed to approve the financial arrangement between the National Physical Laboratory and the Office in respect of the transfer of the observatories, reported to the Sub-Committee meeting on 3rd August, 1910 (Minute 262).

It was noted that the sum of £30 18*s.* 10*d.*, the unexpended balance on 30th June, 1910, of a grant from the Government Grant Committee is reported by Dr. Glazebrook (M.O. 2,590) to be available for experimental work in Seismology at Eskdalemuir.

270. *Publications.*—Submitted—the following report from the Clerk of Publications :—

Publications issued since 6th July, 1910.

The Trade Winds of the Atlantic Ocean	500 copies received.
Annual Report	500 „ „

271. *Director's Report and Accounts.—International Meteorology :—*

INTERNATIONAL METEOROLOGICAL COMMITTEE, NINTH MEETING, BERLIN, 1910.

The ninth meeting of the International Meteorological Committee was held on Monday, September 26 and the three following days at the Royal Prussian Meteorological Institute, Berlin, on the invitation of Geheimrat Hellmann, Director of the Institute and Secretary of the Committee. Of the seventeen members of the Committee there were present Messrs. Shaw (Great Britain), president, Hellmann (Germany), secretary, Angot (France), W. G. Davis (Argentina), van Everdingen (Holland), Maurer (Switzerland), Mohn (Norway), Palazzo (Italy), Ryder (Denmark), Rykatcheff (Russia), Stupart (Canada), and Trabert (Austria). The members who were unable to attend were Messrs. Chaves (Portugal), Hamberg (Sweden), Nakumura (Japan), Walker (India), and Willis Moore (United States). Of the Presidents of the Commissions for special subjects appointed by the Committee, who are *ex officio* entitled to attend the meetings, Geheimrat Hergesell, President of the Commission for Scientific Aeronautics, was present. Sir Norman Lockyer, President of the Solar Commission, and M. Teisserenc de Bort, of the Commission du Réseau Mondial, were prevented from attending on account of their health. The presidents of the other Commissions were present as members of the Committee. M. Melander, director of the Meteorological Service of Finland, and Professor F. H. Bigelow of the United States Weather Bureau until recently, and now of the Meteorological Service of the Argentine Republic, who were present in Berlin in connection with the Commission for Terrestrial Magnetism and Atmospheric Electricity, were invited to attend the meetings as guests.

The first meeting was noteworthy for the number of members attending for the first time, no fewer than eight out of the seventeen places having been filled either at the concluding sitting at Paris in 1907 or by correspondence since that time. The vacancies were caused by the retirement of MM. Mascart and Hildebrandsson at the Paris meeting and of M. Hepites shortly afterwards, and by the deaths of Messrs. Russell (Australia), Billwiller (Switzerland), Sir J. Eliot (India), Lancaster (Belgium), and Pernter (Austria).

Meetings were held at 10 a.m. and 3 p.m. on each of the four days of the session and a full programme was dealt with.

In the first place, after the report of the officers upon the ordinary work of the Bureau and proceedings with reference to the daily telegraphic reports from the Iberian peninsula, the reports of the various commissions were received. Of these four are of long standing, namely those for Terrestrial Magnetism and Atmospheric Electricity, for Scientific Aeronautics, for Solar radiation, and for the comparison of Solar and Terrestrial changes. A special commission for the study of the phenomena of line squalls was appointed at Innsbruck in 1905. At Paris in 1907 additional commissions were appointed for preparing new charts of isotherms for the globe, for questions connected with weather telegraphy, for international questions connected with maritime weather signals and for daily telegraphic reports for the globe (Réseau Mondial). The number of Commissions was thus brought up to nine. Through the lamented death of Hofrat Pernter and Professor Knut Ångström, the Commission for Solar radiation was entirely unrepresented. In the absence of a report and in view of a note upon the subject of Solar radiation from the Weather Bureau of Washington the Committee decided to reconstitute the Commission with Professor Maurer of Zürich as president, and Messrs. Akerblom (Upsala), Bigelow (Buenos Aires), Christoni (Naples), Gorczynski (Warsaw), Hale (Pasadena), Kimball (Washington), Schmidt (Vienna), and G. W. Walker (Eskdalemuir) as first members. Reports with regard to all the other commissions were considered.

The Commission for Terrestrial Magnetism and Atmospheric Electricity had met on the last two days of the previous week. It reported a number of resolutions upon the classification of the character of days with regard to magnetic disturbances, the form and extent of the data to be recommended for publication, and other matters in that connexion. On receiving the report, which dealt exclusively with magnetism, the Committee decided that the time had arrived for the constitution of a separate commission to take up questions of international co-operation in Atmospheric Electricity, and a resolution was passed to that effect.

The Commission for Scientific Aeronautics reported the proceedings of the meeting at Monaco in 1909, and subsequent international co-operation. It was mentioned that delay in the publication of the results for international days had arisen owing to the inadequacy of the funds contributed by international agreement to provide for the continually increasing volume of data contributed by the various institutes and private persons co-operating in the work.

The proposal of Professor Köppen that, for work in connexion with the upper air, pressures should be given in terms of the C.G.S. atmosphere (megadyne per square centimetre), referred to the Committee by the Aeronautical Commission gave occasion for the discussion of the question of units. The proposal had been mooted independently by Professor Bjerknes in Europe and, in slightly different form, by Professor Mc Adie in the United States, and it has been adopted in practice from January, 1909, by the Meteorological Office for various purposes. In connexion with this subject Professor Willis Moore communicated the report of a special committee of officials of the Weather Bureau, which deprecated the introduction of a third set of units for meteorological publications as likely to add to the existing confusion. In view of the wide bearings of the subject the Committee decided that they were not yet in a position to express a final opinion upon the proposal.

The report of the Commission for the Comparison of Solar and Terrestrial Changes, known as the Solar Commission, was concerned mainly with the collection of meteorological data for the whole globe, and put forward a provisional list of stations, at the rate of two for each ten-degree square of latitude and longitude, the data from which it was proposed to publish, along with magnetic and solar data. The selection of stations was illustrated by maps prepared in the Meteorological Office to represent the mean values of pressure and temperature for January, 1905, the latest January for which the necessary data were available in published form, together with maps on the same scale of normals for January, of mean temperature and pressure, taken from published charts, for the purpose of comparison. The president was encouraged to continue his assistance in securing the collection and publication of the data, and he was requested at the same time to arrange for the provision of any necessary facilities for the immediate use of the data by the Commission du Réseau Mondial, which had commenced the collection of data from a certain number of stations representing centres of action. At the same time it was resolved to invite Directors of Institutes to co-operate as far as possible with the latter Commission in promoting the proposal of M. Teisserenc de Bort for daily reports by telegraph from about thirty stations chosen to represent in outline a telegraphic réseau for the globe.

The report of the Commission for Weather Telegraphy brought forward the important proposal to alter the international code of weather telegraphy for Europe by omitting the reading of the wet bulb thermometer, and introducing the "barometric change" as read on a barograph for the interval of three hours before the morning reading. It was decided to recommend to the institutes concerned that the proposal be adopted, and that the change be introduced with the summer service of weather telegraphy on 1st May, 1911. For the time being the British stations would give the change in hundredths of an inch, and Continental stations in tenths of millimetres. Other minor changes were also recommended.

The report of the Commission for Maritime Weather Signals evoked a good deal of discussion. Ultimately it was agreed to recommend for general adoption a system of day signals based on two cones proposed by the Commission, and to refer the proposal for night signals based on two lanterns in vertical line for further consideration, in view of representations as to the possibility of confusion arising with existing signals put forward by the Board of Trade, and by the representatives of the maritime offices of Germany and France.

The two commissions last mentioned, of both of which the Director of the Meteorological Office is president, were continued as permanent commissions in order that they may take into consideration any questions arising in connexion with weather telegraphy or with marine meteorology respectively. Commissions have the power of co-opting members at discretion, and it is anticipated that these commissions will become an organised means of progress in the international development of meteorology in the two important branches which form their subjects.

The Commission for the revision of the charts of mean isotherms for the globe represented that the work of discussing the information which already exists was a matter for personal rather than

co-operative effort, and a similar representation came from the Commission for the study of line squalls to which contributions had been made by various authors and especially by Lempfert and Corless in this country. The two commissions were therefore allowed to lapse.

Various other propositions were considered and adopted including three by Professor Hellmann on meteorological organisation in the Colonies, the desirability of a monthly weather report, and on the restriction of the gale symbol to forces above 7 and other points in connexion with international weather symbols.

Such encouragement as the Committee had at its disposal was given to the suggestion of Professor Bjerknes for the computation for the purposes of aerodynamical study of charts from strictly isochronous data and to a proposal of M. Palazzo for the regular observation of the neutral points in connexion with atmospheric polarisation. The vexed question of the measurement of snow was also brought up by M. Palazzo and that of evaporation by Mr. W. G. Davis, who explained the system in use in Argentina, but the Committee was unwilling to formulate regulations on these points. Notes with regard to scientific questions upon which international co-operation is desirable, forwarded by Professor Willis Moore, were for the most part referred to the special commissions concerned therein.

Two items came from another absent member of the Committee, Major Chaves, the energetic Director of the meteorological service of the Azores Archipelago. The first reported the establishment of a system of wireless telegraphic stations in the islands which brought the most Western islet, Flores, into communication with Horta, whence the most effective cable communication with Europe and America is an operation and explained the additional facilities thereby afforded for meteorological work and for shipping. The second, which was accompanied by a covering letter from M. Eiffel, made a proposal for the preparation, on an international basis, of an atlas of charts of meteorological data for stations in all parts of the world similar to those published by M. Eiffel for France. The President and M. Angot were authorised to communicate with M. Eiffel and M. Chaves upon this question.

The meeting concluded with the presentation to the Committee on behalf of M. Teisserenc de Bort of two proof copies of the revised edition of the International Atlas of Clouds.

On the day before the meeting commenced the members of the Committee joined the members of the Magnetic Commission in a visit to the Meteorological, Geodetic, and Astrophysical Observatories at Potsdam and the Magnetic Observatories at Potsdam and Seddin. The latter is a country station about 8 miles from Potsdam sufficiently remote from traffic to give trustworthy magnetic records in place of those of Potsdam now affected by trolly cars. After the conclusion of the meetings a day was spent in visiting the Royal Prussian Aerological Institute at Lindenberg under the guidance of the Director Geheimrat Assmann. All those who had the satisfaction of seeing the magnificent equipment and arrangement of these institutions will carry away a profound impression of the magnitude of the work and a grateful remembrance of the kindly hospitality of the Directors of these institutions and the cordiality of their staffs.

Commission for Terrestrial Magnetism and Atmospheric Electricity.

Report by Dr. C. Chree, F.R.S., of the Meeting in Berlin, September 23rd–24th, 1910.

The International Committee for Terrestrial Magnetism and Atmospheric Electricity met on September 23rd and 24th in the Meteorological Institute, Berlin, under the presidency of General Rykatchef of St. Petersburg, with Dr. Ad. Schmidt of Potsdam, as Secretary. The meetings on both days lasted from 10 a.m. to 5 p.m., with an interval for lunch.

The meetings were attended by the chiefs of the meteorological services of Great Britain, Canada, Russia, Germany, France, Italy, Holland, and Finland. Amongst the others who attended were Messrs. Dubinsky (Pavlovsk), Liznar (Vienna), Kesslitz (Pola), Messerschmidt (Munich), Lecointe (Uccle), v Carlheim Gyllensköld (Stockholm), Bigelow (Argentine), and Chree (Kew).

Mr. Dubinsky presented a report on the comparison of the standard magnetic instruments at different observatories made by himself and Mr. Savinov between December, 1907, and August, 1909. The stations at which observations were made included Pavlovsk (near St. Petersburg), Karsani (near Tiflis), Irkutsk, Katharinenburg, Upsala, Potsdam, Rude Skov (near Copenhagen) and Kew. The results of similar comparisons made by the observers of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington had been sent by Dr. Bauer and were communicated to the meeting.

It was reported by Mr. Lecointe that another object on the programme of the International Committee, viz. :—the preparation of a list of Magnetic Observatories, had been executed under the auspices of the Royal Observatory of Belgium by Messrs. E. Merlin and O. Somville, and published under the title " Liste des Observatoires Magnétiques et des Observatoires Séismologiques, Bruxelles, 1910." It includes, besides the name and geographical position of each observatory, particulars as to the staff and instrumental equipment.

A discussion was initiated by Dr. Chree as to the nature of the international material now published by Dr. van Everdingen at de Bilt, the magnetic station of the Netherlands, respecting the magnetic character of each individual day. Estimates of the amount of disturbance are contributed by a large number of magnetic observatories. Dr. Chree pointed out that there are at present obvious differences between the standards of disturbance in use at observatories which suffer similarly from magnetic storms, and expressed an opinion that the usefulness of the work would be enhanced if some more definite guiding principles were laid down. Dr. Ad. Schmidt, on the other hand, thought that the work rather gained by the diversity of the aims at present actuating those who assess the magnetic character of the days at the different observatories, as this secured the representation of a great variety of views. A small committee consisting of Messrs. Schmidt van Everdingen, and Chree was appointed to consider and report upon the subject.

In connexion with the general question of uniformity of the publications of magnetic observations at different stations, Dr. Schmidt urged the importance of giving the mean daily and monthly values of the magnetic elements, and urged the Committee to pass a resolution to the effect that such mean values should be included in the irreducible minimum of information which every observatory should publish. Doubts were expressed by more than one speaker whether the proposal would not place too heavy a burden on a number of observatories, and after a long discussion the matter was referred to the Executive Bureau.

The question of the expediency of taking a line integral of magnetic force round a parallel of latitude was raised in a communication from the International Association of Academies asking for advice. This was considered by a Special Committee, who had before them a long communication from Dr. L. A. Bauer, who expressed the opinion that the subject might well be deferred pending the conclusion of the general magnetic survey of the globe now on the programme of the Carnegie Institution. A report to that effect was made to the International Meteorological Committee.

General Rykatchef communicated to the meeting an account, contributed by Dr. Bauer, of the ocean magnetic survey work done during the last few years by the Carnegie Institution's vessels "Galilee" and "Carnegie."

The meeting passed a resolution thanking Prof. Palazzo for the efforts he had made to secure the existence of a magnetic observatory in Italian territory, and expressing the opinion that an observatory in Tripoli would be of special value.

Short accounts of recent or prospective magnetic work in different countries were given by several members. Mr. Stupart mentioned that the Meteorological Service of Canada entertained hopes of running magnetic instruments for a term of years at some station in the vicinity of Hudson's Bay, and asked the opinion of the Committee as to which of several possible sites appeared the best.

Exhibitions, &c.—Reported—the receipt of a request from Dr. F. Mollwo Perkin, of the Exhibitions Branch of the Board of Trade for an exhibit for the Turin International Exhibition, 1911.

Also—an invitation to take part in the International Geographical Congress at Rome in 1911.

Meteorological Data in Colonial Blue-Books.—Seeing that some Colonial Blue-Books now contain useful meteorological data, the Director wrote to the Colonial Office on November 9, 1909, suggesting the desirability of providing for the printing of additional copies of their data for circulation to meteorological libraries through the Meteorological Office. (*See* P.C. 5054/09).

We are now informed that a letter has been sent from the Colonial Office to the Officers administering the Governments of Crown Colonies asking that this be done. (*See* Circular attached to M.O. 2223/10).

Reports of Work.—1. *Marine Branch.*—Data for South America and Nova Scotia completed for Admiralty; data for Baltic in preparation. 113 meteorological logs, 3 short logs, 7 lighthouse registers, 651 North Atlantic registers, 269 registers for radiotelegraphy, and 94 Indian Ocean registers examined. Issue of the North Atlantic Meteorological Chart for July to October completed, November issue begun on 13th October. Indian Ocean Meteorological Chart published for August to December; extension of chart to 35°S.—data charted for May to February. International Balloon Ascents—observations in Northern Hemisphere for 8 a.m,, July 27 to August 1, 1908, collated and plotted for Professor Hergesell. (vii.) Preparing reproductions of Daily Weather Charts of the Antarctic Seas. The Charts for 1903 and January to July, 1902, are now passing through the press, and the reductions of August, 1902, and October to December, 1901, are ready for Lithographer. In the press, 19 months; ready for press, 4 months; still to do, 7 months.

The estimate of cost (at rates ordinarily charged) of work done for public offices, £50 2*s.* 6*d.*

2. *Forecast Division.*—The work has been transferred from Victoria Street to South Kensington in the course of the month of October. The issue of Daily Weather Reports and the preparation of the transfer for the Atlantic Maps have been carried on without interruption.

Current work on Weekly and Monthly Weather Reports, and preparation of Monthly sheet (Form 313) up to date.

The transfers were not ready for despatch till after 11 a.m. on 4 days.

No. of wireless messages received :—

	From H.M. Ships.	From Ships of Mercantile Marine.
In August	1	392
September	3	307
October	9	397

The present state of the work of the Division is as follows :—

(1) D.W.R. Correction sheet, last issued, July.
(2) Forecast Checking completed up to 25 July.
(3) Completion of Working Charts for binding, up to 1 August.
(4) Wireless messages from Ships of Mercantile Marine compared with M.S. returns and reported to Branch 1, up to end of August.
(5) Wireless messages from H.M. Ships examined and reported to Admiralty, up to date.
(6) Tabulation of Gradient Velocities, complete up to middle of May.
(7) Frequency of winds blowing with varying degrees of velocity, tabulated up to end of July, checked to end of April.
(8) Storm Warning Checking :—
Preliminary checking, up to end of October.
Final checking, up to end of 1909.
(9) Harvest Forecast service ceased at the end of September. The checking from the returns supplied by the observers has not been commenced.

3. *Statistical and Library Branch.*—British Meteorological Year Book, Parts I., II., III., up to date. Usual work for library. Inquiries (July to October, 1910) as follows :—Newspapers, 42 ; legal, 20 ; scientific and commercial, 167 ; forecasts, 40 ; general, 17. The receipts in connexion with these amounted to £8 17*s.* 8*d.*

The estimate of cost (at rates ordinarily charged) of work done for Public Offices is as follows :—

	£	*s.*	*d.*
English Registrar-General	6	15	0
Irish „ „	1	2	6
	£7	17	6

4. *Instruments' Branch—Observatories.*—Preparation of Part IV. of Year Book 1910 for printer :—The Hourly Readings for May, June, July, August, and September (Valencia and Aberdeen), have passed through the press ; and the printer has the September copy for Falmouth and Kew.

The tabulation of daily amounts of sunshine, to ascertain the diurnal variation at various stations, is in hand.

Copper plates have been ruled for the printing of the forms used on the Dines' and Scilly-pattern anemometers, and for the supply of logarithmic drawing paper.

A glass millimetre scale has also been ruled.

The curves and tabulations for the years 1903–8 have been looked through and sent to the binder.

Fortrose and Fowey have been added to the list of sunshine stations.

Considerable time has been taken up in preparing for removal to the new office at South Kensington.

The routine work has been kept up to date.

Instruments.—The usual Admiralty and Office work.

The reporting barometer at Malin Head Station has been replaced by another instrument.

At the request of Professor Seton, a set of instruments for a Climatological Station was sent to Leeds for exhibition at the Yorkshire Agricultural Show in July.

Storm-warning Cones have been renewed at Caldy Lighthouse and Dungarvan.

During the period thirteen boxes have been sent out for the return of Meteorographs.

Instruments have been supplied against repayment as follows :—

W. E. Sotheby, Esq.	Bridlington Grammar School.
Dr. J. T. Wilson, Hamilton.	Dr. C. C. Vigurs.
Cockle Park, Morpeth.	Rhyl Urban District Council.
Rev. H. H. Breton, Sheepstor.	T. V. Philpott, Esq.
Rev. T. Barton, Oswaldkirk.	Dr. John Keay.
Dover Corporation.	W. Tattersall, Esq., Sevenoaks.
Dr. E. C. Jee.	Royal Grammar School, High Wycombe.
Dr. E. Baily, Oban.	L.C.C. School, Eltham.
Colwyn Bay District Council.	G. Rossiter, Esq., Teignmouth.
J. Stretton, Esq., Derby.	John Bissett, Esq., Insch.
Lister Park, Bradford.	A. Watt, Esq., Edinburgh.

A Thermograph, Hygrograph, and small Cup Anemometer have been lent to Capt. C. F. Dampier, R.N., for experimental work.

Ten Requisitions have been received from the Crown Agents for the Colonies :—

Negri Sembilan (2), East African Protectorate (2), Gibraltar (2), Southern Nigeria, Gold Coast, Northern Nigeria, Jamaica, also two from the Commonwealth of Australia.

Six Colonial Requisitions are still on hand.

5. *Investigation of the Upper Air.—Quarter ended 30th June,* 1910.—The ordinary work of the station was carried on as usual, but an additional number of registering balloons was sent up in May in connection with Halley's comet. I am glad to be able to report that every balloon sent from here was found, and all the traces were satisfactory, also the average height reached was very good.

Owing to the change of date for the international week from November to August, and the necessity for getting six extra meteorographs ready for the May ascents and 20 extra for the week in August, there has been very little time available for kite-flying, but I am again able to report that no mishap has occurred to the kites during the quarter. There are now considerable arrears of work in the way of repairs and maintenance to be made up, and it will be another month or more before the ordinary three kite ascents per week can be resumed.

The old boiler had unfortunately become very thin in places, and although it stood the hydraulic test to 150 lbs. per square inch (it is worked to 100 lbs.), I judged it safer to obtain a new one, which is now being fitted. The old boiler certainly ought to have lasted much longer, as it has only had eight years of careful use.

Observatories.—Kew (July).—The barograph, thermograph and (Robinson) Anemograph curves have been tabulated as usual and the ordinary meteorological data sent up weekly to the Office.

A selection has been made of the electrically quiet days for May and June, and the curves have been measured. Absolute potential gradient measurements have been made daily.

A determination has been made of the electrometer scale value, and one of the seismograph scale value.

The seismograph record from January to June, 1910, has been examined and a list of the seismic tremors sent (as usual, for each half year) to Prof. J. Milne.

The following absolute observations have been made :—

		Number.
Magnetic	Declination	3
	Horizontal Force	3
	Inclination	3
Electrical Dissipation (Elster and Geitel)		12
Pyrheliometer (Ångström)		6

The cylindrical float in the experimental Pressure Tube recorder was replaced by the ordinary float on the 14th—during a visit paid by Mr. Corless,—and since the 18th records have been taken with pressure alone and suction alone alternately.

An examination has been commenced of the differential records obtained with the cylindrical float with the object of comparing the influence of four rows of suction holes and of one row of suction holes through the intermediary of the original form of head.

A report on the results obtained since 1897 with the Wilson "Radiointegrators" has been made to the Director. Meantime readings continue to be taken daily with the three radiointegrators Nos. 11, 25 and 26.

Mr. Baker, who was away on holiday during the first half of the month, has since his return devoted five days to determinations of moment of inertia of the Kew collimator magnet, in order to supplement the existing data before sending final figures to Mr. Dubinsky and Dr. Bauer for the Kew values of the horizontal force during the international observations made by Mr. Dubinsky and Mr. Pearson. The additional 20 determinations thus obtained have been practically reduced.

In reply to a request from the U.S. Coast and Geodetic Survey, copies of three days magnetic curves in 1908, and hourly tabulations of declination and horizontal force for these days, have been completed and despatched to Washington.

Information as to Kew magnetic declination has been supplied at the request of a member of the Heriot-Watt Staff for the purposes of chart construction.

The reduction of the Castle O'er barograms has been proceeded with.

Eskdalemuir (July).—Staff.—Mr. Gendle left for his holiday on 19th July.

Meteorological.—The usual eye observations at 10, 16, 22 hours have been made daily.

The following recording instruments have been regularly at work :—

Photographic barograph,
Beckley rain gauge,
Campbell Stokes' sunshine recorder,
Dines' anemometer,
Richard barograph.

The corresponding tabulations have been carried on. New thermometers have been fitted in the photographic recorder. We await the Director's approval of the traces. New measuring scales will be required before tabulation can be resumed.

Magnetic.—The usual absolute observations have been made.

On 11th July the Adie recorders were modified so that the old H magnet now records the North Component and the old D magnet records the West Component. The change took only a few hours to complete and the scale values have been very constant.

	North Comp.	West Comp.	Vertical Comp.
12th July	87·3 γ per cm.	86·4	77·2
18th „	86·4	86·4	77·2
21st „	87·3	86·4	78·6

Two bifilar magnetometers brought from Kew have been cleaned. An attempt will be made to make them record photographically on the Watson chronograph so that the temperature co-efficients of the Adie magnets may be investigated. The quartz suspension of the Watson magnetograph again broke, and the new instrument has not yet been sent from Bushy.

Electrical.—The Dolezalek electrometer was fitted with new mirrors and the needle loaded to prevent tilting. The scale value was adjusted to about 110 volts per cm. A test up to nearly 900 volts shows that the scale is nearly uniform and that the adjustment is nearly symmetrical.

The new Zn-Cu voltmeter has also recorded well generally at about 300 volts per cm., but a large movement on 21st indicated that the adjustment was not quite symmetrical, and that during large and very rapid changes the needle was insufficiently damped. These points will be remedied, and I have asked Dr. Glazebrook for two strong magnets with a view to putting electromagnetic damping on the needle. A determination of the natural leak of the system last week gave a time constant of 53 minutes.

Several determinations of conductivity have been secured, and a determination of absolute potential gradient gave a factor of 6 for the electrograph readings.

Solar Radiation.—Two readings of intensity were obtained.

Seismology.—Prince Galitzin came on the 3rd July, and, in order to supervise the erection of the Galitzin seismograph presented by Professor Schuster, remained till 7th. During that time the superintendent was chiefly engaged in assisting Prince Galitzin to set up and standardise the new seismograph. The Wiechert seismograph has also been set up, and the adjustment is considerably improved.

Owing to the presence of workmen repairing the floor, it was considered advisable not to run the Galitzin seismograph; and the other instruments have also been partially interrupted. It is hoped that the workmen will have finished this week.

Schuster Readership.—Report by Mr. Gold.—The following is an account of my work as Schuster Reader during the past year. In the Michaelmas term I gave a course of weekly lectures the syllabus of which I sent to you a year ago. I also prepared a paper on the deduction of the radiating power of the atmosphere from meteorological observations. The manuscript of this I sent you early in the present year. During the Lent term I made some progress in an investigation of the effect of varying the temperature and radiating power of the lower part of the atmosphere on the height and temperature at which the advective region begins. Some results from this were communicated in abstract at the recent meeting of the British Association.

The remainder of the year, with the exception of a week spent in inspecting stations in connexion with the Office, was devoted to the preparation of a report on the methods of taking and reducing meteorological observations. The first three sections of the Report, on Marine Meteorology, on Climatological Work, and on Forecasting and Dynamical Meteorology are finished, but the fourth and last section which deals with first order observatories is not quite ready.

Accounts.—Reported—travelling expenses in connection with journies to Eskdalemuir, Watlington and Berlin in the half-year ending October, 1910, amounting to £25 1*s.* 3*d.* (*See* account 374.)

Submitted—The following Statement of Accounts for the Six Months ending 30th September, 1910 :—

RECEIPTS.						EXPENDITURE.					
1909. £ s. d.		£ s. d.		1910. £ s. d.		1909. £ s. d.		£ s. d.		1910. £ s. d.	
2,327 10 4	Balance from year 1909–10	—		2,206 14 8		500 0 0	Director	—		500 0 0	
7,950 0 0	Parliamentary vote	—		8,375 0 0							
	DEPARTMENTAL EXPENSES REPAID:						OFFICE SALARIES:				
						3,428 1 0	Monthly	3,654 19 5			
						263 1 7	Weekly	310 18 2			
88 6 5	Forecasts, &c. ...	115 13 3								3,965 17 7	
	Marine, Statistics, and Observa-						OFFICE EXPENSES:				
						365 16 1	Rent, Fuel, &c. ...	352 16 1			
42 15 5	tories	25 13 8									
							Furniture, Fittings,				
16 5 7	Instruments ...	18 4 2				54 14 0	&c....	78 6 9			
				159 11 1		115 3 11	Incidental Expenses	171 13 7			
	INCIDENTAL EXPENSES REPAID:									602 16 5	
140 17 2	Forecasts, &c. ...	153 14 10					POSTAGE AND TELEGRAMS:				
40 19 3	Other Branches ...	38 2 4				132 5 2	General Postage ...	142 19 3			
	Stationery Office						Postage of D.W. Re-				
18 11 4	Account ...	26 10 11				155 0 3	ports	169 5 9			
				218 8 1		1,028 1 11	Telegrams, &c. ...	1,120 8 6			
	TELEGRAPH CHARGES REPAID:									1,432 13 6	
							TRAVELLING EXPENSES				
106 8 6	Home	120 18 1				145 7 2	AND INSPECTIONS ...	—		186 12 2	
	Telegrams sent										
313 10 6	abroad	266 12 7				853 13 9	SUPERANNUATION ...	—		516 0 0	
				387 10 8							
	INSTRUMENTS:						COST OF INSTRUMENTS:				
						193 3 9	Royal Navy	315 9 4			
	Mercantile Marine,						Mercantile Marine,				
524 7 11	Stations, &c. ...	—		707 11 6		652 4 10	Stations, &c. ...	665 15 8			
	OBSERVATORIES, &C.:									981 5 0	
—	Kew	218 12 4					OBSERVATORIES:				
—	Eskdalemuir ...	250 0 0				—	Kew	365 3 7			
—	Valencia	8 15 0				—	Eskdalemuir ...	276 0 5			
—	Other items ...	25 6 6				—	Valencia	226 14 6			
				502 13 10			Allowances for other Observatories, Ob-				
	SUPERANNUATION ACCOUNT:					1,601 10 8	servers, &c. ...	1,091 10 7			
283 15 0	Annuities... ...	282 10 0								1,959 9 1	
	Interest on Invest-					182 1 9	LECTURES AND EXPERIMENTS ...	—		397 9 10	
23 18 4	ment	31 15 5									
	Income Tax re-						ANTARCTIC METEOROLOGY...	—		10 5 2	
9 7 6	turned	—				—					
				314 5 5							
	LECTURES AND EXPERIMENTS ...	—		162 3 2			BALANCE:				
12 10 0						2,180 16 5	Cash at Bank ...	2,529 15 8		—	
						48 1 0	,, at Office ...	51 14 0		—	
										2,581 9 8	
£11,899 3 3				£13,033 18 5		£11,899 3 3				£13,033 18 5	

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
1,395 6 11	To sundry creditors	1,437 12 8		2,228 17 5	By cash at Bank and at Office ...	2,581 9 8	
175 12 6	,, superannuation	154 12 6		243 3 9	,, Admiralty	365 9 4	
49 11 8	,, salaries reserved	—		200 13 1	,, Sundry debtors	233 14 4	
1,255 17 8	,, balance	1,768 19 3		203 14 6	,, M.O. instruments in stock ...	180 11 1	
£2,875 8 9		£3,361 4 5		£2,875 8 9		£3,361 4 5	

NOTE.—On 30th September the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £2,761 1*s.* 3*d.*

Submitted—The following statement :—

	£	s.	d.
Bank balance on 30th June, 1910	2,461	12	10
Receipts from 1st July to 31st October, 1910	10,553	15	10
	13,015	8	8
Cheques drawn from 1st July to 31st October, 1910	6,932	17	6
Bank balance on 31st October, 1910	6,082	11	2

THIRTY-THIRD MEETING.

South Kensington, London, S.W., 7th December, 1910.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

CAPTAIN HARVEY. | REAR-ADMIRAL PUREY-CUST.

DR. SCHUSTER.

272. The Minutes (262–271) of the last meeting (2nd November, 1910), were read and confirmed.

The draft reply to the Treasury respecting the licence for Kew Observatory, as printed in Minute 262, was approved.

A draft letter (P.C. D 550) to the Postmaster-General, accepting in this instance liability for service telegrams sent to the "Senior Naval Offier, Portland," was approved (Minute 262, 5, 19th October).

273. *New Office* (Minute 268).—(*a*) *Dilapidations.*—Read—the following letter and enclosure :—

H.M. Office of Works, &c.,
Storey's Gate, Westminster, S.W.,
28th November, 1910.

SIR,

IN reply to your letter of the 11th instant (3,948/09), I am directed by the First Commissioner of His Majesty's Works, &c., to forward to you herewith a letter received from the Secretary of the Westminster Trust, Limited, intimating that the landlords are willing to accept the sum of £120 to cover all the liability of the tenants under the dilapidation clauses of the lease of the Meteorological Offices at No. 63, Victoria Street.

This amount is reasonable, and it is considered that it should be agreed to.

I am, &c.,
W. J. DOWNER.

The Director,
Meteorological Office,
South Kensington, S.W.

The Westminster Trust, Limited,
30, Victoria Street, Westminster,
24th November, 1910.

DEAR SIR, 61, Victoria Street, S.W.

WITH reference to our interview to-day, when we inspected the condition of the offices lately occupied by the Meteorological Council :

I beg to say that we are willing to accept the sum of £120 to cover all liability of the tenants under the dilapidation clauses of the lease.

Yours faithfully,
D. H. F. ALLDRIDGE,
Secretary

H. E. Seccombe, Esq.,
H.M. Office of Works,
Storey's Gate, S.W.

(*b*) *Balcony Boards.*—It was agreed that steps be taken to find suitable means of exhibiting balcony boards no longer required for the outside of the Office premises.

(*c*) *Furniture.*—Reported—that intimation had been received (M.O. 4,027) from the Supplies Division of the Office of Works to the effect that the sum assigned in the Estimates (*see* Minute 108) for the furnishing of the Office having come to an end, there were no funds available to complete the furnishing as set out in the Schedules considered with Mr. Goddard on 21st April, 1910. A list of items required to complete the Schedule and to furnish the basement rooms was submitted.

It was agreed that a letter be written to the Office of Works asking whether they or the Committee should approach the Treasury on the subject.

(*d*) *Hot Water Supply.*—It was agreed that, if necessary, formal application be made for the supply of hot water to the ladies' lavatory.

(*e*) *Cases for Hall* (Minute 268).—Read—M.O. 3,993 from Sir Henry Tanner, enclosing a sketch of three show cases for the first-floor hall, to contain historical instruments for the periods of the Board of Trade (1854–1866), of the Meteorological Committee of the Royal Society (1867–1877), and of the Meteorological Council (1877–1905) ; enclosing also an estimate at £45 for the cases, of £12 12s. each for three bronze tablets, commemorative of Admiral FitzRoy for the first case, of General Sabine and Mr. Scott for the second, and of Professor Henry Smith and Sir Richard Strachey for the third ; also £10 for a device for two small panels for Office cyphers, according to design submitted, to be placed over the entrance doors.

It was agreed to order the cases and to approve the design for the tablets and the device, and to carry out the design provided that funds for the panels and tablets could be raised by subscription.

274. *Programme of Work for* 1911–12 (Minute 263).—The programme of work was approved.

It was agreed to consult Mr. Middleton as to the letter of application to the Treasury for a grant from the Development Fund, and to make the application in the form agreed upon between the Director and Mr. Middleton.

In view of the removal of the Office from the neighbourhood of St. James's Park, a memorandum by Mr. Lempfert on the London observations for the Daily Weather Report was read, and it was agreed that if observations from Kew were adopted for the daily weather service it would be desirable to make arrangement, if possible, for continuing a station in St. James's Park and the exhibition of charts there, and to supplement the observations on the Office roof by a climatological station at ground level in the immediate neighbourhood.

275. *Estimates for* 1911–12.—It was agreed to alter the draft estimates of Minute 266 by the transfer of £100 from Superannuation Fund to Office Salaries, in order to allow for the appointment of a boy clerk as telephone clerk and of a messenger for the second floor messenger's office.

The estimates as modified were approved, together with the following draft of a covering letter to the Treasury :—

SIR, 12th December, 1910.

IN compliance with the request of their Lordships' letter (18015/10) of the 11th October, 1910, I am instructed by the Meteorological Committee to enclose an estimate of the expenses of the Meteorological Office for the year 1911–12.

The total of the estimate corresponds with the sum fixed by their Lordships in their letter (3780/10) of the 26th February, 1910. The excess of £100 over the figure of last year is accounted for by the fact that the transfer of Kew Obervatory dated from July 1st, 1910, and the provision for the financial year 1910-11 included only three-quarters of the annual sum allowed on that account.

The Committee have decided to defray, out of the accumulated balance at their disposal, certain exceptional expenses in connexion with the removal to South Kensington, beyond the ordinary costs of furnishing and removal, which are provided for under the arrangement notified in Their Lordships' letter of the 30th May, 1907. This exceptional expenditure, which includes dilapidations at 63, Victoria Street, and other items still to be provided for, will amount to about £850.

The Committee have some difficulty in making an estimate for 1911–12 because the conditions of their occupation of the new premises are different in some respects from their past experience, and some unexpected charges are included in the lease of the premises. According to their judgment, however, the figures given will cover the costs under the several heads.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
London, S.W.

276. *Royal Meteorological Society.—Grant for Inspections* (Minute 179).—Read—M.O. 4,011 from the Royal Meteorological Society asking for the payment of £25 for the year 1910 in consideration of the inspection of 22 stations, about which reports had been sent in.

Also—an application for a grant towards the expenses of inspecting the Society's stations for the year 1911.

Also—memorandum by Mr. Lempfert upon the subject.

The payment of £25 for 1910 was authorised, and with regard to the application for 1911, it was agreed to say that the Committee consider our present arrangement not to be in the best interests of meteorological progress and that they propose to discontinue it on 31st December, 1911, and, in the meantime, to allow the £25 for the year ending on that date.

277. *Directors' Report and Accounts:—*

Commander F. W. Sergeant has written (M.O. 3,501) calling attention to the refusal of the Office to sanction the loan of instruments to the s.s. "Dakar," and contrasting the amount of encouragement to the captains and officers of ships given by the American Weather Bureau and Hydrographic Office with that given by the Meteorological Office. Dr. Schuster has also written, 17th July, 1910, giving his experience during recent Atlantic voyages of the want of effective organisation for the service of wireless messages from Atlantic liners.

Information has been received (M.O. 3,778) from the British Consul-General in Hamburg, through the Board of Trade, that the Deutsche Seewarte has organised a system of distribution of weather information by wireless telegraphy in the interests of German fishing vessels and small craft on the North Sea and Baltic.

In reply to a suggestion that an arrangement should be made with the Post Office for telephone subscribers to obtain weather intelligence by telephone, a letter (M.O. 3,755) has been received from the Post Office stating that the Postmaster-General does not see his way to any satisfactory arrangement.

Office Staff.—Recommended—that until further order Mr. Brodie be excused attendance until 8.30 a.m. when on morning forecast duty, and that the allowance for special service be altered in his case from 20 per cent. to 15 per cent.—Approved.

Recommended—that in consequence of the illness of her mother, Miss Humphreys be allowed to attend for mornings only, and to count the rate of payment at £60 per annum.—Approved.

Dr. Chree has contributed a report on the comparison at Kew of the radio-integrators according to the design of the late Dr. W. E. Wilson.

Reports of Work.—1. *Marine Branch.*—Data for Baltic, Islands in the Southern Indian Ocean, and Yangtsekiang in preparation for Admiralty. 29 Meteorological Logs, 153 North Atlantic Registers, 56 Registers for Radiotelegraphy, and 17 Indian Ocean Registers examined. Issue of the North Atlantic Meteorological Chart for November completed. December issue begun on 17th November. Indian Ocean Meteorological Chart for January, 1911, in the press; extension of chart to 35° S.—data charted for May to March. International Balloon Ascents—observations in Northern Hemisphere for 8 a.m., 27th July to 1st August, 1908, collated for Professor Hergesell are now charted. (vii.) Preparing reproductions of Daily Weather Charts of the Antarctic Seas. The charts for 1903 and January to July, 1902, are now passing through the press, and the reductions of August, 1902, and October to December, 1901, are ready for lithographer. In the press, 19 months; ready for press, 4 months; still to do, 7 months.

The estimation of cost (at rates ordinarily charged) of work done for public offices, £9 2*s.* 6*d.*

2. *Forecast Division.*—(1) Current work on the Daily, Weekly and Monthly Reports, and on the Atlantic Charts up to date. The transfer was sent to the lithographer after 10.50 a.m. on 17 occasions.

(2) Number of wireless messages received :—

from H.M. Ships	4
from Mercantile Marine	348

(3) Those received from H.M. ships have been reported to the Admiralty at the end of each week.

The number of books of carbon duplicates of messages received from ships of the mercantile marine has been 40. The work of examining them has been completed up to the end of October. We have now 33 books in hand which have not been examined.

(3) Corrections to Daily Weather Report issued for August and September. October prepared, and in the hands of the printer (now issued).

(4) Forecast checking completed up to 20th August.

(5) Tabulation of gradient wind velocity for four stations completed to end of May.

(6) Frequency of winds of different velocities tabulated to end of September, checked to end of April.

(7) Checking of Harvest Forecasts in progress.

(8) Mr. Harries has spent 14 hours on an inquiry for the Admiralty regarding gale frequency on the Irish coasts. Approximate cost incurred to date at 2*s.* 6*d.* per hour = 35*s.*

(9) Completion of working charts for binding up to 26th August.

(10) The number of inquiries answered has been as follows :—

Prepaid replies	24
Telegraphic inquiries (application by letter or personally) ...	3
Inquiries answered by telephone	2
Personal inquiries answered immediately	1
Total	30

Serial forecasts have been sent to 10 persons. Two of these were on the list for a part of the month only.

Account for fees on prepaid replies prepared for Post Office.

(11) No progress has been made with the storm warning checking. The "preliminary checking" will be discontinued, its place being taken by the daily reports to the Director.

(12) A new system has been started of keeping account of telegrams despatched. Though it will not relieve the work of the division I hope that it will be of considerable assistance to the office in preparing accounts for subscribers for telegrams, and in checking Post Office Accounts.

3. *Statistical and Library Branch.*—British Meteorological Year Book, Parts I., II., III. up to date. Usual work for library. Inquiries (November, 1910) as follows : Newspapers, 5 ; legal, 9 ; scientific and commercial, 42 ; forecasts, 2 ; general, 2. The receipts in connexion with these amounted to £8 13*s.* 0*d.*

The estimate of cost (at rates ordinarily charged) of work done for public offices is as follows :—

	£	*s.*	*d.*
English Registrar-General	3	0	0
Irish „ „	0	2	6
Admiralty, Hydrographic Department ...	12	7	6
	£15	10	0

4. *Instruments Branch.—Observatories.*—Preparation of Part IV. of Year Book, 1910, for printer :—The Hourly Readings for September for Falmouth and Kew have passed through the press, and the printer has the copy for October.

Insch has been added to the list of stations sending sunshine cards, and Derby and Mount Mellick to those sending barograms.

The examination of the Observatory records, checking the measurements of the sunshine cards, and the various tabulations of wind and rainfall records, have been kept up to date.

The curves and tabulations received from the Observatories have been satisfactory.

The staff of the room has been employed a considerable time in sorting out and storing official records, and on mechanical work (Mr. James).

Instruments.—The usual Admiralty and Office work.

Instruments have been supplied against repayment, as follows :—

A. Watt, Esq., Edinburgh.	W. Sutton, Esq., Woolhampton.
J. Bissett, Esq., Insch.	A. H. Pawson, Esq., Watlington.
W. T. Lawrence, Esq., Penrith.	Rev. A. Doak, Carr Bridge.
Rev. V. F. Willson, Grantham.	Dr. W. H. Bryce, Fife.
Board of Trade, for Melbourne.	Dr. A. Thomas, Aberystwyth.

One requisition has been received from the Transvaal Meteorological Department, and one from the British South Africa Company.

Four Colonial requisitions are still in hand.

Observatories (August–November).—*Kew.*—The usual tabulations and data have been supplied to the Office. Cloud observations have been made in connexion with international balloon ascents. Absolute measurements of magnetic declination, horizontal force and inclination, also of electric potential gradient, and dissipation, and of solar radiation have been made from time to time. Two scale values of the electrograph and one of the portable electrometer (at Teddington) have been obtained. The experimental heads in connexion with Mr. J. S. Dines's investigation of the factor of the pressure tube anemometer have been taken down. Reduction of some further records obtained for this investigation has proceeded.

Measurements of the Castle O'er barograms have been made, and a report of a discussion of the results has been forwarded to the Office. A comparison of the harmonic co-efficients for Castle O'er with those for the observatories is in progress.

A discussion of the observations made with the radio-integrators since 1907 is in hand.

Eskdalemuir.—Various alterations to the buildings have been carried out mainly with a view to preventing the entry of water. The damp in the magnet house has now entirely disappeared.

Meteorology.—The usual eye observations have been made. The recording instruments have been kept in good order and tabulation has proceeded.

Magnetism.—The usual absolute measurements have been made. The Adie magnetographs are now in regular operation. The two old magnetometers from Kew have been set up to assist in determining the temperature corrections of the Adie instruments.

Seismology.—The Milne and Galitzin instruments are in operation, but their registration parts require attention. The Wiechert instrument is not running.

Electricity.—The Ebert apparatus is in operation, and the Dolezalek electrometer has been satisfactorily standardised. Trouble was experienced owing to the invasion of the apparatus by spiders. This has now been overcome.

Library.—The reports and papers have been recatalogued.

Accounts.—Submitted—the following statement :—

	£	s.	d.
Bank balance on 31st October	6,082	11	2
Receipts from 1st November to 30th November	111	11	0
	6,194	2	2
Cheques drawn from 1st November to 30th November ...	1,244	7	5
Bank balance on 30th November	4,949	14	9

THIRTY-FOURTH MEETING.

South Kensington, London, S.W., 1st February, 1911.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW. | MR. MIDDLETON.
CAPTAIN HARVEY. | REAR-ADMIRAL PUREY-CUST.

DR. SCHUSTER.

278. The Minutes (272–277) of the last Meeting (7th December, 1910) were read and confirmed.

279. *Obituary.*—Reported—that Sir Francis Galton, F.R.S., who was a member of the Committee of Investigation of 1865, of the Meteorological Committee of the Royal Society from 1867 to 1877, of the Meteorological Council from 1877 to 1901, member of the Kew Committee of the Royal Society from its institution in 1871, and Chairman from 1889 to 1900, died on Tuesday, 17th January, 1911, in his 89th year, and that at the Director's request, Dr. Chree had attended the funeral at Claverdon on Saturday, 21st January.

280. *New Office* (Minute 273).—*Dilapidations* (M.O. 3961/10).—All serviceable property of the Office has been removed from 63, Victoria Street. The balcony boards are in charge of the Works Division of the Office of Works. The obligation for dilapidations agreed upon by the Office of Works at £120 has been discharged by the payment on 30th December, 1910, to the Westminster Trust, Limited, of that sum (cheque 1024/10) together with the rent for the quarter ending 31st December, 1910, and all claims in respect of the tenancy of the premises at 63, Victoria Street by the Office thereby terminated.

Meteorological Office Press.—Reported—that intimation had been received from the Stationery Office that a tender by Messrs. Wyman & Sons, Ltd., for the printing of the Daily Weather Report, the Monthly Meteorological Charts of the Atlantic and Indian Oceans, and other lithographic work for the Office, upon conditions laid down in the

contract dated 9th December, 1910, had been accepted by the Controller, the printing to date from 1st January, 1911 (M.O. 4083/10); that the machinery had been installed and the Daily Reports printed on the premises from Monday, 2nd January, 1911, and that the Monthly Meteorological Charts of the Atlantic Ocean for February and the Monthly Charts of the Indian Ocean for March were in hand; that to provide accommodation for the lithographic machine press and two hand presses as well as the stone trough and cutting machine a larger part of the basement room No. 1 was required than had been anticipated; that a requisition had been sent to the Office of Works for a partition to separate one-quarter of the room at the south end from the rest by a zig-zag line in order to provide for a workshop at the south end for Office use at a cost of £19, which is to be charged against the Office if necessary; that the printing of the Daily Weather Report had been successfully carried out except on 18th January, when a breakdown in a new motor delayed the issue of a large part of the edition until 8 p.m.

Reported also—that a gas supply had been laid on for the workshop and printing office by the Office of Works upon requisition which may be regarded as recoverable from the Office.

Reported further—that it would be necessary to change the position of the house telephone now cut off from the workshop, and to provide for an extension line from the exchange telephone in order to enable the various officials to communicate with the printing office, and the printers' workmen to communicate with their headquarters.

Reported further—that Messrs. Wyman & Sons had requested that a ventilating fan should be installed in one of the north windows in order to carry away the chalk dust used to dry the copies printed on one side for immediate reprinting on the reverse; that the Office of Works had undertaken to carry out the proposal at a cost to the Office of £17 10*s*.

Approved.

Sunshine cards.—Reported—that a supply of 2,000 cardboard boxes (13 ins. × 6 ins. × 4¼ ins.) for storing the cards of recorded sunshine had been ordered from Messrs. S. Shearmur & Co. at a cost of £12 1*s*. 11*d*.

Cases for Hall.—Sketches for the tablets for the three cases in the hall were submitted and approved.

Furniture.—Reported—the following letter (D. 581) to the Office of Works in accordance with Minute 273 (*c*):—

D. 581.

SIR, 16th December, 1910.

I UNDERSTAND from the Supplies Division that the funds available for the furnishing of this Office have come to an end. The workmen employed in making fittings have been withdrawn.

In order to report upon the furnishing to the Meteorological Committee, I have gone over the building and compared the provision with the requirements as set out in a memorandum which Mr. Goddard and I discussed in April of this year, and which was accepted as a provisional basis of requirements.

I will append to this letter a schedule of items which have been omitted or left incomplete for want of funds, and to that list I have added certain other items which were not included in my memorandum or which have required alteration from the original scheme.

The list is not a long one, and the sum necessary to complete the work is not large, but the Committee desired me to refer to the original letter of H.M. Treasury of 30th May, 1907, from which it would appear that Their Lordships understood the estimate as being intended to cover "the initial furniture required, on the understanding that such of the existing fittings and furniture of the present Office as are serviceable should be utilised in the new building."

The Committee regret that the sum estimated has proved insufficient to carry out what would appear to have been Their Lordships' intention, and in the circumstances it seems necessary that Their Lordships should be informed of the position, and Their pleasure taken as to whether the original intention should be carried out.

As the Treasury letter to which I have referred was addressed to The First Commissioner, I was to ask on behalf of the Committee whether the Office of Works would be good enough to represent the matter to Their Lordships, or if the Meteorological Committee should themselves take it up.

The Committee are aware that as soon as the furnishing of the building as intended by Their Lordships is completed, the cost of further additions and repairs fall upon the Meteorological Office grant.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Office of Works, &c.,
Westminster, S.W

SCHEDULE of ITEMS REQUIRED to COMPLETE the FURNISHING of the NEW PREMISES at SOUTH KENSINGTON, as REPORTED to the METEOROLOGICAL COMMITTEE, DECEMBER 7TH, 1910.

Items *omitted* from the schedule of April, 1910 :—

Interview chairs, or wooden chairs with arms :

Director's room, one.

Director's Assistant's room, one.

Marine Superintendent's room, one.

Superintendent of Statistics' room, one.

Superintendent of Forecasts' room, one, to replace an unserviceable one from the old Office.

High chairs : Forecast room, four, to replace chairs which are too low for the forecast table

High stools : Superintendent of Forecasts' room, two.

Laboratory stools : Six.

Racks and shelving : Room 27 ; Store-room off room 22

**Foot-mats :* Twenty-two.

†*Sliding-door cupboards :* Room 11.

Items *not included* in the schedule of April, 1910 :—

Step ladders : The ladders brought from 63, Victoria Street, with a little attention, are sufficient, except

a folding stepladder to be available for the Director's room and two adjoining rooms,

a 14 ft. ladder for the Superintendent of Statistics' room, and

a 7 ft. folding ladder for the Laboratory (Room 27).

Fittings in basement : These could not be specified until the question of printing was decided. In addition to a partition and certain structural arrangements for the presses, some fittings are required in the workshop, a wood rack, a glass rack, &c.

A shelf for the telephone clerk in Room 11 to take down messages.

‡*Lockers in the tea room :* Eight, each 6 ft. high, 1 ft. 4½ ins. wide.

**Foot-mats :* I am surprised at the deficiency of foot-mats, as we were supposed to have a set at 63, Victoria Street, but the statement given appears correct.

For the tables where a number of persons sit close together, viz., Room 25, and the readers and workers' tables in the Library, separate small foot-mats get displaced, and look untidy, I suggest a strip for the former, and larger squares for the latter. This would set free enough small mats for the rest of the Office.

A black wool foot-mat is wanted in the Director's room ; two in the Superintendent of Statistics' room ; and two in the Superintendent of Forecasts' room.

†*Sliding-door cupboards :* These were specified for the part of the Ante-room behind the counter, which is used as an Office-Keeper's quarters, and the cupboard is wanted for stationery and stores.

A press brought from the old Office was set up for the purpose, which it has served for many years, but it is so much out of keeping with the rest of the fittings in the room, that it has been removed. The accommodation is, however, urgently required. As the fitting must be a wall fitting in keeping with the panelling, I have mentioned the matter in the Architect's Department.

‡*Lockers in the tea room :* There is no position in the Forecast Room (No. 25) where hat and coat hooks can be placed, but the tea room adjoining is only occupied occasionally and could well accommodate a row of lockers. Lockers are required instead of hat and coat hooks because the room is necessarily kept open during office hours without anyone in charge of it.

Telephones.—Reported—that the installation of telephones in accordance with the plans sent to the engineering department of the Office of Works had been completed and was satisfactory except in the following particulars :—

Room 7.—The exchange telephone is inconveniently situated.

Room 20.—The leads are taken across the ceiling.

Room 11.—The leads are taken over the panelling.

The payment of the yearly rental was authorised on the understanding that these alterations will be carried out.

New System Private Telephone Co.—Reported—that the New System Private Telephone Company claimed that the contract for five years certain dating from November, 1906, with subsequent termination at the option of either party by a year's notice, must be read to mean that six yearly rentals at least are payable, and that the sum due on the surrender of the contract is £18 6*s.* instead of £9 3*s.* as estimated, and that Mr. Comyn, of the Solicitor's Department of the Treasury, was of opinion that the claim was correct.

The payment of the amount was authorised.

At Home (Minute 268, iv.).—Reported—that the cost of refreshments for the party on 1st December, 1910, was £26 17*s*.

It was agreed to charge the cost against the Office accounts if on inquiry of the Audit Office it was ascertained that the expenditure could be sanctioned (*see* P.C. D 068, M.O. 576).

281. *Forecast Division.—Application for grant from the Development Fund* (Minutes 263, 274).—It was agreed that the Director be named as a witness to appear before the Commission, if necessary, in support of the application.

London Stations for the Daily Weather Report.—Reported—that arrangements had been made as follows ; to date from 1st January, 1911 :—

The observations at 7 a.m. and 6 p.m. in St. James's Park to be discontinued, with the payment of a gratuity of £3 3*s*., the usual bonus to telegraphic observers, to F. Pearce, the observer ; and in lieu thereof observations to be supplied from Kew Observatory at 7 a.m., 1 p.m., and 6 p.m., the observations at 7 a.m. to be taken by W. Corrin so long as he is on duty as caretaker and observer, and those at 1 p.m. and 6 p.m. by the regular observatory staff, one of them remaining till 6 p.m. on overtime for the purpose.

In view of the revised duties at the Observatory, the salary list at Kew for the year 1911 was made as follows (Order 145) :—

	£	*s*.	*d*.
Assistants :—Mr. E. Boxall	155	0	0
„ B. Francis	145	0	0
„ G. Harris	52	0	0
„ F. Levin	41	12	0
Caretaker (including 7 a.m. observations when on duty): —W. Corrin	81	10	0

In order to provide for the adequate representation of the conditions of weather within the administrative area of London, it has been arranged for observations to be supplied daily by telephone from the following :—

St. James's Park (Office of Works) :—Humidity 3 p.m. and 9 a.m., max. and min. temperature, rainfall.

Westminster Training College (by post) :—Sunshine.

Royal Observatory, Greenwich :—Humidity, temperature, rainfall, and sunshine.

Camden Square (British Rainfall Organization) :—Humidity, temperature, rainfall, and sunshine.

Hampstead (Scientific Society) :—Humidity at 9 a.m., temperature, rainfall, and sunshine.

Bunhill Row (De La Rue & Co.) :—Sunshine.

In order to provide for the customary 6 p.m. observation in London to be supplied to newspapers and press agencies, application (P.C. D 001) has been made to the Trustees of the British Museum for permission to make use of the grass plot on the north side of the path leading from Exhibition Road to the back of the Museum of Natural History.

The arrangements for the substitution of the observations at Kew for those in St. James's Park fell through in consequence of the illness of the caretaker, attributed by the medical attendant to the flooding back of the drains in the basement during December. Provision was made on the 30th December for quarters for the caretaker and his family on the first floor instead of the basement, leave of absence was given for a week, and the duty of reporting at 7 a.m. was taken over for the time being by G. Harris, at a payment of 1*s*. for each morning's attendance on week-days, 2*s*. on Sundays or holidays.

In consequence of the change of printer the outlines of the maps for the Daily Weather Report have been revised and brought to the scale of 1/20,000,000 and 1/40,000,000, as contemplated in Minute 173. The first page has been revised to take in Newquay as a voluntary telegraphic reporting station and subsequently to replace Dover, which had been transferred to p. 4 in accordance with the wishes of the corporation. Page 4 has been revised to find room for the new scheme of London Stations.

The revised arrangements were completed on 31st December, 1910, and were embodied in the report, printed at the Office for the first time on Monday, 2nd January, 1911.

Supply of Information to the Press.—Submitted—the following memorandum from the Superintendent of the Forecast Division :—

SUPPLY OF INFORMATION TO THE PRESS.

In consequence of revised arrangements in the Forecast Branch it is now practicable to make manifold copies of evening observations received from the telegraphic stations and a large number of the health resorts for distribution to the press.

The question is raised whether the distribution should be made gratuitously on both sides by including the sheet of observations with the evening issues, or whether a charge should be made against the newspapers for the information, or against the health resorts for the advertisement.

The service involves some incidental expense on account of inspections, and it would be reasonable to say that we will not include the observations without inspection, and that a charge of £4 would be made for the visit of an Inspector.

A. and C. are now being supplied to the press.

B. can be supplied in future.

A. WEATHER PROSPECTS.

GENERAL INFERENCE from Observations at 6 p.m., 31st January, 1911 : The weather over the United Kingdom will continue to be influenced by the large Continential anticyclone, which is likely to extend further to the westward. Fair, cold weather is therefore still probable, but pressure will become more uniform than of late and fog or mist is likely to re-appear in many English districts.

Districts.	Forecasts for the 24 Hours— Midnight Tuesday to Midnight Wednesday.	† The Further Outlook.
0. SCOTLAND, N. { Islands ... Mainland ...	Southerly or South-Westerly winds, light ; fair ; cold	Cold weather is likely to continue.
1. Do. E.	Light variable breezes ; fair generally, but misty or foggy in places ; remaining cold	
2. ENGLAND, N.E. { Northern part Southern part		
3. Do. E.	Easterly winds, decreasing in strength ; fair generally, but misty or foggy in places ; remaining cold...	
4. MIDLAND COS. { Eastern part... Western part		
5. ENGLAND, S.E. { London and Channel.		
6. SCOTLAND, W. { Mainland ... Isle of Man...	Southerly or South-Easterly winds, light ; fair ; cold	
7. ENGLAND, N.W. { England, N.W. North Wales...	Same as Nos. 1 and 2	
8. Do. S.W. { South Wales... England, S.W.	Same as Nos. 3 to 5	
9. IRELAND, N. ... { Western part Eastern part...	Light to moderate breezes, chiefly Easterly ; fair ; cold	
10. Do. S. ... { Eastern part... Western part		
11. WN. CHANNEL & BAY	Fresh Easterly to North-Easterly winds, and a rather rough sea ; fair ; cold ...	

STORM WARNINGS :—*** indicates that the South Cone is flying ; *** indicates that the North Cone is flying in the District.

† If the Meteorological conditions are such that no satisfactory indication of the weather beyond the 24 hours can be given, this column will be left blank.

Meteorological Office, S.W.

B.

WEATHER REPORT for the BRITISH ISLES from OBSERVATIONS at 6 p.m., 31st JANUARY, 1911.

Stations.	Barometer. Ins.	Wind.	Temperature. Max.	Temperature. Min.	Rainfall. In.	Sunshine. Hrs.	Weather Notes.
Sumburgh Head...	30·70	Calm	48	—	—	—	Fine.
Stornoway ...	30·69	S., light air	43	—	—	—	Fine, hazy day.
Castlebay	30·69	S., gentle	44	—	—	—	Fair, misty.
Malin Head ...	30·66	S.E., light air	44	—	—	—	Fine, misty.
Blacksod	30·63	S.E., fresh	43	—	—	—	Fine, misty.
Valencia	30·54	N.N.E., light air	46	—	—	—	Very fine day.
Roche's Point ...	30·60	E., fresh	43	—	—	—	Sharp, hazy day.
Donaghadee ...	30·70	S.W., gentle	42	—	—	—	Misty.
Holyhead... ...	30·67	N.W., light air	45	—	—	—	Very fine.
Scilly	30·45	E., high	44	—	—	—	Fair at first, now misty and gloomy.
Jersey	30·48	E., strong	37	—	—	—	Fine, misty, hoar frost earlier.
Portland	30·57	E.N.E., strong	39	—	—	—	High wind all day, fine.
Dungeness ...	30·62	E.N.E., fresh	35	—	—	—	
Dover	30·69	E., fresh	34	—	—	8·6	Cold, breezy and sunny day.
Nairn	30·68	Calm	36	—	—	6·3	Fine.
Aberdeen	30·70	W.N.W., light	40	—	—	—	Very fine, hazy.
Shields	30·72	S.S.W., light	39	—	—	—	Cloudy to hazy.
Yarmouth ...	30·75	E., gentle	35	—	—	7·3	
Clacton-on-Sea ...	30·71	E., moderate	36	—	—	8·0	Fair to fine.
Bath	30·64	Calm	37	29	—	7·8	Bright and cold.
London (Kew) ...	30·70	E.N.E., gentle	35	29	—	6·3	Very fine, hazy day.
Oban	30·72	Calm	44	22	—	6·0	Fine day, hoar frost early.
Blackpool... ...	30·67	E.S.E., light air	36	26	—	4·8	Fine.
Southport... ...	30·71	S.E., light air	38	—	—	6·0	Fine.
Rhyl	30·64	E., light air	38	28	—	6·2	Fair.
Colwyn Bay ...	30·62	E., gentle	43	31	—	7·5	Cloudy, then fine, now fair.
Llandudno ...	—	—	—	—	—	7·1	
Bettws-y-Coed ...	—	—	—	—	—	—	
Aberystwyth ...	30·60	E., light	42	31	—	7·5	Cloudy.
Newquay	30·53	E., gentle	40	34	—	7·4	Fine, hazy. Fine day.
Paignton	30·58	N.E., high	40	36	—	4·0	Fine.
Torquay	30·56	E.S.E., high	41	36	—	4·9	Fine.
Weymouth ...	30·52	E., strong	37	30	—	7·0	Fine all day.
Bournemouth ...	30·63	N.E., light air	37	28	—	8·0	Fine.
Southsea	30·60	E.N.E., gentle	37	29	—	8·0	Fine.
Worthing	30·65	N., light air	37	28	—	7·9	Fine.
Brighton	30·59	N.E., fresh	36	28	—	8·1	Fine.
Seaford	30·56	N.E., fresh	35	28	—	7·8	Fine.
Eastbourne ...	30·61	E.N.E., fresh	38	31	—	7·8	Dull.
Bexhill	30·68	N.E., light air	37	30	—	7·6	Fine.
Hastings	—	—	—	—	—	8·3	
Littlestone-on-Sea	—	—	—	—	—	7·4	
Folkestone ...	30·60	E., light	38	28	—	7·7	Fine.
Deal	30·70	E., moderate	36	30	—	8·2	Fair at first, fine later.
Ramsgate	—	—	—	—	—	7·8	Fine.
Margate	30·60	E., moderate	37	28	—	7·5	Fine.
Felixstowe ...	30·70	E.N.E., fresh	36	32	—	8·3	Fine.
Lowestoft... ...	30·74	E., moderate	36	32	—	8·0	Fine.
Skegness	30·75	S.E., light	38	32	—	7·0	Fine.
Scarborough ...	30·69	W., moderate	—	32	—	5·8	Fine.
Harrogate ...	30·70	S.S.W., light air	36	22	—	6·1	Fair.

C. METEOROLOGICAL OFFICE.

EVENING REPORT on the WEATHER of NORTH WESTERN EUROPE.

Tuesday, 31st January, 1911.

The weather over western Europe remains under the influence of a large anticyclone, and the highest pressures, 30·7 ins. and upwards, are now found over the north and east of England, the North Sea, Holland, and North Germany. A depression in which readings are below 29·9 ins., still lies over the Spanish Peninsula, and another disturbance, with readings below 30·0 ins., is skirting western Iceland. The mercury is rising slowly over the whole of the United Kingdom and France.

Easterly to north-easterly winds are blowing over France, the Netherlands, and the southern portions of the United Kingdom, and are still strong to high in force on the Channel coast. Over our northern districts the wind is chiefly southerly, while in Scandinavia and Denmark (to the eastward of the region of maximum pressure) it is north-westerly.

Temperature has again fallen, and is now considerably below the normal in most places. In all but the extreme western and south-western portions of the United Kingdom the evening readings are below 40°, and at some of our northern and central stations they are below the freezing point. Frost prevails also in central France, in Holland, and in Sweden ; in western Iceland the thermometer is only slightly below 45°.

The weather is fine and bright over western Europe as a whole, but dull and misty at some of the Scandinavian stations.

The sea is rough in the Channel, and rather rough off the south of Ireland, slight or smooth elsewhere.

Over a large portion of Great Britain the thermometer to-day has failed to reach 40°, and at some places in the east and south-east of England it has not exceeded 35°. The amount of bright sunshine has been generally very large, between 8 and 8½ hours on several parts of our south and east coasts. Wireless reports from the Atlantic show that as far west as the fourteenth meridian ships have experienced moderate to fresh easterly breezes, and cloudy weather.

London Observations:—

Kew.—6 p.m., Bar., 30·70 ins. ; Ther., 33° ; Wind, E.N.E., gentle ; Weather, very fine.
Since 6 p.m. yesterday, temp. in shade, highest, 35° ; lowest, 29° ; lowest on grass, 25° ; rainfall, nil.
Bright sunshine, 6·3 hours.

Bright sunshine recorded was, at

	Hrs.		Hrs.		Hrs.
Nairn	6·3	Weymouth	7·0	Deal	8·2
Oban	6·0	Bournemouth	8·0	Ramsgate	7·8
Blackpool	4·8	Southsea	8·0	Margate	7·5
Southport	6·0	Worthing	7·9	LONDON (S. Kensington)	4·9
Rhyl	6·2	Brighton	8·1	Clacton-on-Sea	8·0
Colwyn Bay	7·5	Seaford	7·8	Felixstowe	8·3
Llandudno	7·1	Eastbourne	7·8	Lowestoft	8·0
Bettws-y-Coed	?	Hastings	8·3	Yarmouth	7·3
Aberystwyth	7·5	Bexhill	7·6	Skegness	7·0
Newquay	7·4	Littlestone-on-Sea ...	7·4	Scarborough	5·8
Paignton	4·0	Folkestone	7·7	Harrogate	6·1
Torquay	4·9	Dover	8·6	Bath	7·8

It was agreed that the full information from the health resorts which wish the information to be communicated should be supplied free to newspapers and press agencies, and that a charge of £4 per annum be made in respect of each station to cover the cost of inspection.

Storm Signals.—The consideration of a letter (M.O. 413) from Lloyds', with respect to the introduction of the Scheme of Signals proposed by the International Commission for Maritime Weather Signals (Minutes 209, 271) was postponed.

282. *Office Staff.—Student Assistant* (Minute 262).—Reported—that it had been arranged for Mr. T. Carlton Sutton's engagement to terminate as from 30th November, 1910.

Marine Branch.—Reported—that Mr. C. Harding, principal assistant in the Marine Branch, who joined the Office in 1861, would attain the age of 65 years on 5th February, 1911.

It was ordered that Mr. Harding's tenure be continued until 30th September, 1911, and that a maximum pension of £150 a year in accordance with the Regulations for the superannuation allowances for classified clerks (Minute 172) dating from 1st October, 1911, be secured to him by the purchase from the Commissioners for the Reduction of the National Debt of an annuity of that amount ; the annuity to date from 1st October, 1911, or 1st April, 1912, whichever is the more advantageous time for the purchase from the Commissioners.

Appointments (Minute 275).—Reported—the appointment of W. J. Winter, as general office messenger, replacing E. J. Pithers, as from 7th November, 1910, at wages of 25*s.* a week for attendance 9 a.m. to 5 p.m., and as from 9th January, 1911, at wages of 28*s.* a week for attendance from 8 a.m. to 5 p.m.

Approved.

Reported—the appointment of Norman C. Bradnock, born 15th December, 1894, as telephone clerk, upon the terms for boy clerks, at 14*s.* a week dating from 2nd January, 1911.

Approved.

The appointment of a workshop and laboratory boy at 10*s.* a week instead of an additional messenger under Minute 275 was authorised.

The following orders were approved :—

Order 146 : regulating the hours of duties and wages of office keepers, messengers, office and laboratory boys.

Order 148 : regulating the payment for overtime in connexion with the completion of the arrangements of the Office for 1st December, 1910.

Order 149 : regulating the duty of attending to the instruments installed at the Office, and providing for payment of double pay for one hour and travelling expenses, if any, for the necessary attendance on Sunday mornings.

Order 151 : authorising the attendance of an office keeper or one of the senior messengers as deputy on Sunday evenings to take charge of the office-keeper's room while the Office is open, viz., from 6 p.m. to 8.30 p.m., with pay of 3*s.* for each attendance for an office keeper, and 2*s.* 6*d.* for a senior messenger.

Orders 152, 153, 154 : regulating the duties and payments to four cleaners, and the appointment of Mrs. H. Piper, Mrs. M. J. Berry, Mrs. A. Kiy, and Miss A. Dew, as cleaners, with Mrs. Piper as chargewoman.

Read—a letter (M.O. 178) from Mrs. Drane, caretaker at 63, Victoria St. since the death of her husband, asking for a gratuity in consideration of long service to the Office and straitened circumstances.

The Director was asked to express the regret of the Committee that they were unable to comply with the request, as the terms of appointment of caretaker at Victoria St. were not on the lines of weekly wages for the individual employees.

283. *Anemograph Stations.—Quilty* (Minute 251).—Submitted—the following report from Mr. R. H. Curtis upon his visit to the Quilty, Co. Clare, for the erection of an anemometer :—

PRESSURE-TUBE ANEMOMETER AT QUILTY.

I have to report that on 17th December I left for Quilty, co. Clare, to erect there the Signalling Pressure-Tube Anemometer specially designed for giving warning of wind-forces likely to imperil the safety of trains made up of the light carriages used on the West and South Clare Railways.

On the 18th I met Mr. Barrington, the engineer-in-chief of the line, at Limerick ; and on the 19th I left with him for Quilty, *via* Ennis.

The whole of the apparatus had arrived, and Mr. Barrington had arranged for a number of men to be present to assist in the erection of the mast. There was, however, a scarcity of appliances, such as ladders and ropes, or anything out of which a derrick could be contrived, and this made the work very difficult.

A foundation of concrete had been prepared, but I did not like the arrangement for stepping the mast, and I had that part of it altered. Excellent anchorages had been made for the wire stays by "setting" in concrete a piece of steel rail ; the hooks of the tightening screws could not, however, be fastened to them until I had a "fish-plate" bolted to each, with suitable holes for taking the hooks. The mast was then screwed together, and left for the night.

On the 20th I had the compo. tubes fitted and led through the mast, and the "head" having been screwed on, the mast was with considerable difficulty reared and fixed in its place. Mr. Barrington then left for Limerick.

On the 21st I led the tubes from the mast into the hut and fitted them to the Anemometer, and made the various adjustments of the float, &c. which were necessary. Mr. Fitton, the station master, who is to have charge of the instrument, and Mr. Scully, the linesman, who is also to occasionally examine it, were present all the while, and had pointed out to them everything it was desirable for them to know.

The pattern of "head" used in this instrument is Munro's latest, in which the compo. tubes are dropped vertically from the head through the mast, and are held up by a plate which rests upon the rim of the mast. After the mast was up I could not recall exactly how I had left this plate, and I was unwilling to leave Quilty with any sort of doubt upon the point. As I have said, there was an absolute lack of proper appliances for the work. The mast had to be hauled up by the wire stays, by men standing upon an improvised stage resting on a couple of trestles, the boards secured by a length of thick rope (too thick for hand work) which had been found at one of the stations. We had but one ladder, which, when placed on this stage, did not reach the top of the mast, and the only thing for holding it to the mast was some string I chanced to have in my pocket. But when the question of reaching the head was mooted Coastguard Beere at once volunteered to climb the mast and examine it, and did so. The plate had been properly fixed, but unfortunately Beere reversed it and then was unable to get it back again, and had to come down to rest. He then went up again, but owing to the cold and the rain his hands became numbed, and he had again to descend without getting the plate back, and in coming down he lost his hold and fell.

Very fortunately his fall was broken by striking one of the wire stays, and also he struck the ground more or less a glancing blow on the side of a deep drain, into which he fell. He was, of course, much shaken and hurt, but I ascertained that no bones were broken, and after a couple of hours or so he was able, with assistance, to walk back to Seafield.

I have since heard from Mr. Barrington that Beere was laid up for two or three weeks, and that the doctor found that he had dislocated his shoulder.

I regret very much indeed this incident. Men have several times before made similar climbs without accident, but on this occasion there was a fresh cold wind and rain, and to these I attribute the fall.

I returned to Limerick on the evening of the 21st, and to London on the 22nd.

R. H. CURTIS.

P.S.—Since my return I have heard from Mr. Barrington respecting the subsequent history of the instrument.

The "head" was again set up (this time by means of a ladder), but without resetting the plate, and because of this it was not screwed to the mast, nor could it be.

After it had been up a few days, in a moderate breeze on the 11th, the "head" was blown off, and it was not until a letter could be sent to Mr. Barrington explaining the position that he was able to get the plate reversed and the "head" properly screwed to the mast.

The traces which have been received have been very good—clear and fine lines, properly adjusted to zero. They show the exposure to be excellent by the entire absence of the large, erratic oscillations so common at stations where trees, &c., break up the wind current (*see* traces 5, 19, 21, 22, 23, &c.). The strongest mean force has been about 36 m. per hour, and the highest gusts 50 m. on the 25th, and 51 m. per hour on the 27th.

From Mr. Barrington I have also learned that Coastguard Beere was laid up in all over three weeks before he was able to return to duty. Without suggesting that the Office has any legal liability in the matter, I would like to submit that he met with his accident in a generous endeavour to serve it, and that his fall was due to circumstances he could not control, and to ask whether, under these circumstances, any small grant by way of solatium could be made to him?

Direction of the Wind.—Before leaving Quilty I pointed out to Mr. Fitton that the tower of a new chapel bore true west from the Anemometer. It is desirable, however, that the cardinal points should be indicated upon the mast itself, and if sanctioned I could get an arrangement made in the Office which could be sent out and easily clamped to it. The observer would then note the direction two or three times a day, and more frequently if the wind was changeable, and enter his observations upon the sheets.

The station master is to receive special pay for attending to the instrument, and I was asked by Mr. Barrington to say that if the Office desired other observations from Quilty, such as rainfall or temperature, he would be glad to arrange for their being made.

The Director was authorised to make inquiry of Mr. W. Barrington, engineer of the line, as to the circumstances of the coastguardsman who was injured.

North Shields.—Read—M.O. 4301/10 from the Tyne Improvement Commissioners reporting the death of Mr. T. Robson, the lightkeeper in charge of the anemometer, and the appointment of Mr. J. H. Nicholson as his successor.

It was resolved that in consideration of the inconvenience of the position for installing the anemometer, which is now dismantled, a report be prepared on the question of re-instating the anemometer or removing it to another site.

284. *Observatories* (Minute 269).—*Gassiot Committee.*—Reported—correspondence with the Office of Works and interviews with their representatives respecting the sanitary arrangements at Kew Observatory, and proposals by the Office of Works for overhauling the internal arrangements and replacing the divided basement story by a single story giving rooms for the caretaker with floors about four feet above their present level, and new floors for the magnetic room and seismograph room raised about a foot above their present level. As these alterations would necessitate the surrender of the sextant room by the National Physical Laboratory and other changes, it seemed desirable

to take into account the circumstances that would arise upon the removal of the testing work to Teddington. At the meeting of the Gassiot Committee on 14th December suggestions were put forward for dealing with the accommodation of the Observatory based upon the principle that it was desirable for the quarters of the resident observer to be on the first floor, and that the basement floor was more suitable for instruments and observatory offices; and that it was further desirable to provide a photographic room against an outside wall, where full illumination could be obtained from time to time instead of using a room dependent entirely upon artificial light. It was decided by the Gassiot Committee to represent to the National Physical Laboratory the urgency of the requirement of space for the satisfactory conduct of the Observatory, and to ask them to take steps for the removal of the testing work to Teddington. In the meantime a temporary revision of the sanitary arrangements to remove the immediate anxiety as to the consequences of flooding has been suggested to the Office of Works, after consultation with their representative at Kew, has been accepted by them, and is now in process of execution.

Eskdalemuir Observatory.—Omori Seismograph (Minute 263).—Reported—that the Omori seismograph lent by the Japanese government is now in working order at Mr. Munro's works, and that instruction would be taken from the Royal Society as to further action.

Valencia Observatory (Minute 248).—It was agreed to authorise the continuance of the magnetic observations at Valencia as heretofore on the understanding that the arrangements for the transfer to the Royal Society of the Trust Fund in the hands of the Earl of Rosse were in process of completion, and that £12 per annum would be available therefrom in augmentation of the salary of the Superintendent of the Observatory.

285. *Publications.*—Reported—that a volume of Appendices on various scientific subjects had been compiled from surplus copies of the Annual Reports and that it was proposed to bind up as many sets as the number of surplus copies will allow, and issue them with a prefatory note and a table of contents.

286. *Director's Report and Accounts:—*

Loan of Instruments.—Instruments have been lent to Captain Dampier, commanding H.M.S. "Defence," the escort ship of H.R.H. the Duke of Connaught on the voyage to South Africa for the opening of the Union Parliament, in order that he might obtain automatic records of pressure, temperature and humidity during the voyage and make special observations of the strength of the Trade Winds. The records and observations have been received and the data are being plotted upon outline charts. The instruments which have been returned by Captain Dampier have now been lent to Dr. W. J. S. Lockyer for use on the voyage to observe the total eclipse of the sun of the 28th April, 1911, at Vavau Island of the Tonga group.

Transmission of Forecasts.—As the result of correspondence with the Exchange Telegraph Company, it has transpired that the daily news message of 75 words specially compiled and transmitted over the Office wire has been forwarded over the Company's private wire from the Central Telegraph Office free of charge, and an advance telegram of the forecast for the London district has been transmitted daily in like manner. In consequence of the removal to new premises the Post Office now makes a charge 1*s.* and 6*d.* per day respectively for the transmission of these messages. To this the Company object and, in consequence the transmission of the news message is discontinued and the forecast is sent by telephone.

Since 1st January, 1911, messages have been drawn up each evening for transmission by wireless telegraphy from the Admiralty to H.M. ships in home waters. Similar messages were supplied to the Admiralty morning and evening from 23rd to 29th December for transmission by wireless to R.M.S. "Balmoral Castle," bringing the Duke of Connaught home from the Cape.

Transmission of Instruments by Rail (Minute 238).—The regulations for the transmission of instruments by passenger train have been amended as from 1st October, 1910. Barometers, thermometers, delicate scientific instruments and other "articles frail or very bulky in proposition to weight" are now accepted at Company's risk by passenger train at a charge of 50 per cent. more than the ordinary parcels rate. Previously such articles were accepted for transmission by passenger train only at owner's risk, for which the charge remains at 25 per cent. in excess of the parcels rate (M.O. 4266/10, 378/11). It is proposed in future to send instruments by passenger train at the Company's risk on the terms mentioned.

Reports of Work.—Marine Branch.—Data for Islands in the Southern Indian Ocean in preparation for Admiralty. 55 meteorological logs, 2 short logs, 275 North Atlantic registers, 82 registers for radio-telegraphy, and 48 Indian Ocean registers examined. Issue of the North Atlantic Meteorological Chart for December, 1910, and January, 1911, completed. February issue begun on 12th January. Indian Ocean Meteorological Chart published for February, and March and April in the press; extension of Chart to 35° S. completed for the twelve months. (vii.) Preparing reductions of Daily Weather Charts of the Antarctic Seas. The Charts for October to December, 1901, January

to August, 1902, and the whole of 1903, are now passing through the press, and the reductions of September and October, 1902, are ready for lithographer. In the press 23 months, ready for press 2 months, still to do 5 months.

2. *Forecast Division.*—(1) From 1st January, 1911, arrangements have been made :—

(*a*) For lithographing the Daily Weather Report on the premises. The copies of the Report are now available for distribution at about 12.15 p.m.

(*b*) For using data from Kew Observatory in the Daily Weather Report, and including in the Report a short table of data from London stations.

(*c*) For the preparation each evening of a message summarising the prevailing conditions, and giving a forecast, for transmission by wireless telegraphy to H.M. Ships.

(*d*) For discontinuing the copying of all telegrams received into the telegram book.

(2) Current work on the Daily, Weekly, and Monthly Weather Reports and on the Atlantic Charts has been kept up to date.

(3) Number of wireless messages received : —

	December.	January.
H.M. Ships	9	13
Mercantile Marine	214	214

Those received from H.M. Ships have been reported each week to the Admiralty.

The carbon duplicates from ships of the Mercantile Marine have been compared with the messages, and errors of transmission have been reported to the captains concerned. The work is now up to date.

(4) Corrections to Daily Weather Report issued for November.

(5) Forecast Checking. The work on the month of November, 1910, is now in hand.

(6) Tabulation of gradient wind velocities for four stations completed up to end of June.

(7) Wind frequency tables prepared to end of November, checked to end of May.

(8) Working charts prepared for binding up to middle of October.

(9) Storm Warning checking completed to end of March, 1910. Records for April now being examined. Arrangements have been made for keeping this work up to date, in so far as it can be done from data received at the Office.

(10) Harvest Forecast checking for 1910 in hand.

(11) The number of inquiries answered has been as follows :—

	December.	January.
Prepaid Replies	24	11
Telegraphic Inquiries (application by letter or personal) ...	5	2
Inquiries by telephone	1	5
Notification of special conditions	—	1
Personal (answered immediately)	1	1
	31	20

Number of recipients of serial forecasts : December, 9 ; January, 7, including the "Admiral, Home Fleet," and a series of messages prepared for transmission by wireless to the "Balmoral Castle," December 23rd–28th.

(12) Some time has been devoted to redrawing an improved outline of the blue stone of the Daily Weather Report.

3. *Statistical and Library Branch.*—British Meteorological Year Book, Parts I., II., III., up to date. Usual work for library. Inquiries (December, 1910 ; January, 1911) as follows :—Newspapers, 26 ; legal, 23 ; scientific and commercial, 106 ; forecasts, 6 ; general, 12. The receipts in connexion with these amounted to £11 1*s.* 7*d.*

4. *Instruments Branch :—Observatories.*—Preparation of Part IV. of Year Book, 1910, for printer :—The Hourly Readings for October and November, 1910, have passed through the press, and the printer has copy for December.

Quilty (Co. Clare) has been added to the list of anemograph stations.

A Gale Table has been prepared showing the gales, and gusts of storm force, recorded in 1910.

The Meteorological Table for the Kew Report has been compiled, and forwarded to the Observatory.

The sunshine cards to the end of 1909 are now being put into boxes—a box holding one station's records for a year ; about 1,200 boxes have been filled and labelled.

The examination of the Observatory records, checking the measurements of the sunshine cards, and tabulation of the wind and rainfall records, have been kept up to date.

The curves and tabulations received from the Observatories have been satisfactory.

Instruments.—The usual Admiralty and Office work.

Instruments have been supplied against repayment to 15 persons or institutions.

Storm cones have been renewed or set up at five stations.

A screen, with a set of recording instruments, has been lent to Dr. W. J. S. Lockyer for observations on the voyage to the Tonga Islands for the British Solar Eclipse Expedition, in continuation of observations made by Captain Dampier, of the "Defence," the Duke of Connaught's escort to S. Africa.

Three requisitions have been received from the Crown Agents for the Colonies :—Mauritius, S. Nigeria, and Federated Malay States ; and one from the Agent-General for the Commonwealth of Australia.

Eight Colonial requisitions are now in hand.

5. *Investigation of the Upper Air.—Mr. Dines's reports.*—(Quarter ended 30th September, 1910).—Work was carried on during the quarter with the following exceptions. I was away for a holiday during the month of July, and for six days during the meeting of the British Association at Sheffield. Also for the first week in August, when I was inspecting stations for the Meteorological Office.

Arrangements were made for the sending up of registering balloons from Pyrton Hill on each of the international days, and in addition I went to Crinan for the international week, August 8th–13th, and sent off eight balloons from there, six of which have been returned. Ten balloons in all have been sent up from Pyrton Hill, but of these only four have been found.

But few kite ascents have been made, and no mishap has occurred. The instruments for Mr. Patterson (Toronto) are now completed, and also some work for Prof. Assmann at Lindenberg, and I hope it may be possible to increase the number of kite ascents during the current quarter.

I regret the increase of expenditure during the two last quarters, but it will be much less so far as I can see this quarter.

(Quarter ended 31st December, 1910).—The ordinary work of the station was carried on as usual during the quarter. November and December were very rough, and on 16th December the wind was too strong all day to admit of a kite being sent up.

Seven balloons were sent up and five recovered ; two of these, viz., of 3rd and 4th November, are of especial interest, as they give records for the time just before and just after the passage of a deep depression directly over the station.

Observatories.—Kew.—The usual routine work has been carried out, and tabulated data from the meteorological curves have been sent weekly to the office.

Observations of the three magnetic elements have been made about once a week, and observations of potential gradient about once in two days.

Observations of electrical dissipation with the Elster and Geitel apparatus were discontinued at the end of December, and a few observations have since been taken with the Wilson apparatus.

Observations with the Wilson "radio-integrators" were continued until the end of December, and were then suspended.

Owing to the illness of the caretaker the usual 10 p.m. observations have been interrupted, but it is hoped to resume them shortly.

The work of a telegraphic reporting station was commenced on 1st January.

Progress is being made with the preparation of the annual magnetic, electrical, and meteorological tables. The seismological data for the year 1910 have been completed.

New drains and cesspools are being laid down by H.M. Office of Works.

Eskdalemuir.—After the meeting of the Gassiot Committee in December, the axes of the north and west component magnets were adjusted so that their axes lay at right angles to and along the line which we believe to be nearly true north. The error in setting by test is not more than 1 part in 700. The verification of the true north is under progress, and referred to below.

New collimators were introduced in the Galitzin seismograph in December, with very satisfactory results.

On 1st January, 1911, the hours were changed to 9 a.m. to 4.30 p.m., and the observation hours to 9h, 15h, and 21h. Joint tabulation of barograph and thermograph was introduced, with apparently considerable economy of time. Regular tabulation of the magnetic and electric records is going on day by day. The V.F. magnet is still rather unsatisfactory. The Watson Q.F. instrument has been tried. It is very much under-compensated, and as I have already 20° torsion on the fibre, I fear the fibre will break before compensation is attained. These points emphasise the urgency of trying the new V.F. instrument I suggested.

An observation of the sun was obtained in the underground passage on 10th January and verified on 12th. The results agreed to 1′ of arc. Dr. Dyson kindly checked my calculation. It remains to transfer the N.S. line obtained in the passage into the room.

Part of the fittings for the polar star window in the hut were magnetically bad, so that we are still without a check on the former sun observations in the hut.

Submitted—the following statement :—

	£	s.	d.
Bank balance on 30th November, 1910	4,949	14	9
Receipts from 1st December, 1910, to 31st January, 1911	5,080	9	3
	10,030	4	0
Cheques drawn from 1st December, 1910, to 31st January, 1911 ...	4,800	19	0
Bank balance on 31st January, 1911	£5,229	5	0

Submitted—The following Statement of Accounts for the Nine Months ending 31st December, 1910 :—

RECEIPTS.						PAYMENTS.					
1909. £ s. d.		£ s. d.		1910. £ s. d.		1909. £ s. d.		£ s. d.		1910. £ s. d.	
2,327 10 4	Balance from year 1909–10	—		2,206 14 8		750 0 0	Director	—		750 0 0	
11,925 0 0	Parliamentary vote	—		12,562 10 0							
							OFFICE SALARIES :				
						5,140 17 9	Monthly	5,531 12 8			
	DEPARTMENTAL EXPENSES REPAID :					398 3 3	Weekly	472 4 4			
133 9 10	Forecasts, &c. ...	155 6 2								6,003 17 0	
	Marine, Statistics, and Observatories						OFFICE EXPENSES :				
54 13 5		59 5 7				530 6 9	Rent, Fuel, &c. ...	638 0 0			
						117 19 11	Furniture, Fittings, &c.	314 9 9			
23 17 7	Instruments ...	23 1 3									
				237 13 0		162 0 4	Incidental Expenses	238 15 7			
										1,191 5 4	
	INCIDENTAL EXPENSES REPAID :										
234 3 3	Forecasts, &c. ...	256 5 7					POSTAGE AND TELEGRAMS :				
						199 16 1	General Postage ...	212 10 11			
62 18 8	Other Branches ...	45 12 5									
	Stationery Office					234 14 7	Postage of Daily Weather Reports ...	255 10 11			
33 13 8	Account ...	35 16 8									
				337 14 8		1,624 4 9	Telegrams, &c. ...	1,741 7 0			
										2,209 8 10	
	TELEGRAPH CHARGES REPAID :										
						293 1 7	TRAVELLING EXPENSES AND INSPECTIONS...	—		316 4 5	
128 11 6	Home	141 8 7									
	Telegrams sent					1,111 13 9	SUPERANNUATION ...	—		774 0 0	
384 10 2	abroad	266 12 7									
				408 1 2							
							COST OF INSTRUMENTS :				
						344 17 6	Royal Navy	386 4 3			
771 2 1	INSTRUMENTS : Mercantile Marine Stations, &c. ...	—		856 2 8			Mercantile Marine,				
						1,001 8 3	Stations, &c. ...	818 3 2			
										1,204 7 5	
	OBSERVATORIES, &C. (*see* below) :						OBSERVATORIES (*see* below) :				
—	Kew	411 3 4									
—	Eskdalemuir ...	750 0 0				—	Kew ... (6 months)	694 8 10			
—	Valencia	17 10 0				—	Eskdalemuir ,,	512 18 4			
—	Other items ...	33 0 0				—	Valencia	355 8 8			
				1,211 13 4			Allowances for other				
						2,358 15 6	Observatories, Observers, &c.... ...	1,585 7 6			
	SUPERANNUATION ACCOUNT :									3,148 3 4	
425 0 0	Annuities	423 15 0									
	Interest on In-						LECTURES AND EXPERIMENTS				
38 8 8	vestment ...	49 0 6				270 14 10		—		357 9 1	
	Income Tax re-										
9 7 6	turned	—									
				472 15 6		—	ANTARCTIC METEOROLOGY	—		10 5 2	
	LECTURES AND EXPERIMENTS ...										
375 0 0		—		314 13 2							
							BALANCE :				
						2,342 16 6	Cash at Bank ...	2,616 6 6			
—	AMOUNT REFUNDED	—		0 0 10							
						45 15 4	,, at Office ...	26 11 11		2,642 18 5	
£16,927 6 8				£18,607 19 0		£16,927 6 8				£18,607 19 0	

LIABILITIES.					ASSETS.			
£ s. d.		£ s. d.			£ s. d.		£ s. d.	
1,640 19 0	To sundry creditors	2,210 1 7			2,388 11 10	By cash at Bank and at Office ...	2,642 18 5	
263 8 9	,, superannuation	494 8 9			419 17 6	,, Admiralty	461 4 3	
70 4 2	,, salaries reserved	4 2 10			319 0 1	,, Sundry debtors	411 14 7	
1,307 18 6	,, balance	1,300 9 3			155 1 0	,, M. O. Instruments in Stock ...	493 5 2	
£3,282 10 5		£4,009 2 5			£3,282 10 5		£4,009 2 5	

NOTE.—On 31st December the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £2,761 1*s.* 3*d.*

Observatories.—Statement of Accounts for the Six Months ending 31st December, 1910 :—

KEW.

Receipts.	£	s.	d.	£	s.	d.	*Payments.*	£	s.	d.	£	s.	d.
Gassiot Trust				212	7	4	Superintendent				347	5	0
National Physical Laboratory				187	10	0	Assistants				221	2	0
Grazing rents, &c. ...				1	6	0	Sundays and holidays ...	6	10	0			
Miscellaneous				10	0	0	Overtime	17	2	9			
To Balance				283	5	6					23	12	9
							Rent, fuel, and lighting ...				45	8	10
							Repairs					—	
							Insurance				15	17	6
							Materials				18	18	10
							New instruments					—	
							Books, printing, and stationery				3	14	1
							Incidental expenses ...				18	9	10
				£694	8	10					£694	8	10

ESKDALEMUIR.

Aug. 17—							Dec. 31—						
Royal Society (Parliamentary grant) ...	250	0	0				Superintendent ...				200	0	0
Oct. 28—							Assistants				115	0	0
Royal Society (Parliamentary grant) ...	500	0	0				Mechanic and caretaker				54	12	0
				750	0	0	Handyman				26	0	0
							Incidental expenses :—						
							Rental of private wire	27	15	0			
							Instruments and repairs to private wire	15	19	8			
							Photographic paper ...	8	5	4			
							Coals and carriage of coals	47	10	0			
							Repairs, &c.	2	12	0			
							Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	15	4	4			
											117	6	4
											512	18	4
							Balance in hand ...				237	1	8
				£750	0	0					£750	0	0

VALENCIA (9 months).

Grazing rent				17	10	0	Superintendent				206	5	0
To Balance				337	18	8	Assistants				91	10	0
							Miscellaneous Expenses ...				57	13	8
				£355	8	8					£355	8	8

1911–1912.

(Seventh year of the Meteorological Committee.)

THIRTY-FIFTH MEETING.

South Kensington, London, S.W., 5th April, 1911.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	REAR-ADMIRAL PUREY-CUST.
MR. MIDDLETON.	DR. SCHUSTER.

287. The Minutes (278–286) of the last Meeting (1st February, 1911), were read and confirmed.

288. *Sixth Annual Report.*—It was agreed to present the report in the same general form as heretofore with the addition of the administrative reports of Kew and Eskdalemuir Observatories as separate sections.

289. *New Office.—Furniture* (Minute 280).—Reported—the following letter 9820/10 from the Office of Works in reply to D. 581 :—

M.O. 767.

H.M. Office of Works, &c.,
Storey's Gate, Westminster, S.W.,
27th February, 1911.

SIR,

IN reply to your letter of the 16th of December last, D. 19, I am directed by the First Commissioner of His Majesty's Works, &c., to inform you that the Board find themselves to be in a position to undertake the supply to the Meteorological Office, out of their own funds, of the articles set out in the schedule enclosed with your letter. Instructions have been given accordingly.

I am, &c.,
W. J. DOWNER.

The Director,
Meteorological Office.

Post Office Charges.—The Director reported that a letter 119900/10, M.O. 885, had been received from the Post Office dated 10th March, 1911, stating that "special "attendance is given at the Branch Office [South Kensington] on behalf of the Meteoro- "logical Office from 7 a.m. to 8 a.m. on week-days and from 7 a.m. to 8.30 a.m., and "from 8 p.m. to 8.30 p.m. on Sundays and at the South Kensington circuit of the "Central Telegraph Office, during these hours at a total cost of £366 18*s.* 8½*d.* a year.

"This estimate of cost which is provisional only and will be altered when the "present female staff at the Branch Office is substituted by male staff will be charged "against the Meteorological Office from and including the 28th of October" :—that the letter had been referred to Mr. Barstow for informal inquiry who reported on 4th April that he understood that the whole matter had been in consequence of a misconception and that the Post Office official whom he had consulted saw no reason why the Meteorological Office should have to pay any increased charge over and above what it paid before the move.

It was, however, pointed out that the telegraphic arrangements at the new office which had been designed to take advantage, in the interest of the public, of the juxtaposition of a Post Office with the Meteorological Office, had been disappointing financially and otherwise in consequence of unexpected charges and restrictions made by the Post Office.

The principal ground for the new arrangement is that it is uneconomical on the whole for the Meteorological Office to keep its own staff of telegraph clerks independent of the telegraph staff of the Post Office in the same building, because the telegraphic work only takes up a part of a Meteorological Office clerk's time, and cannot be specialised as it ought to be for efficient working.

The telegrams are therefore now sent to and received from the Central Telegraph Office by a Post Office clerk, instead of a Meteorological Office clerk using a wire which is "private" in the sense that it is reserved for the use of the Meteorological Office. To facilitate delivery a pneumatic tube is used and a telephone enables the operators at each end of the tube to communicate with each other. £2 a year is charged for the telephones although the arrangement saves the enveloping and delivery by hand of about 150 telegrams a day. On the ground that the wire now used is a public wire and not a private one new charges have appeared in the accounts, viz., 1*s.* and 6*d.* respectively for each daily message to the Exchange Telegraph Company, and 6*d.* daily for handing a message for the Portuguese and Spanish Governments to the Eastern Telegraph Company.

The "private" wire at Victoria Street, operated by a Meteorological official, was available without charge for S.G. messages of inquiry of various kinds. No inquiry is now permitted except by a telegram duly handed in and paid for. The Office has now no more facilities for inquiring about the progress of its telegraph business (which consists in the receipt or despatch of about 200 telegrams a day entirely on behalf of Government) than any other resident in South Kensington.

In view of the misunderstanding which had arisen as to the charges at the new Office and other matters mentioned as well as the reply to the inquiry respecting the cost of distribution of forecasts by telegram printed in Minute 290, the difficulties experienced in conducting the international exchange of daily telegrams in a manner which will bear favourable comparison with that of other countries, and the disability of the Office in the matter of priority for wireless telegrams, it was agreed that the Director should draw up a statement upon which action might be taken to obtain the personal interest of a representative of the Post Office in the efficient and economical working of the service of Meteorological telegrams.

Lease. (Minute 268).—The engrossed copy of the lease of the new premises now ready for signature was laid on the table.

Memorial Bronzes. (Minute 273.)—Reported—that subscriptions amounting to £37 7*s.* 6*d.* had been offered towards the £50 required for the memorial bronzes, of which plasticine models by the Bromsgrove Guild were placed on view.

The list of contributors was as follows :—

Allen, T. E.
Anderson, Miss E. D.
Bayard, F. C.
Becker, L.
Bell, T. D.
Bench, A. T.
Bracey, C. A.
Brodie, F. J.
Buckeridge, Miss D
Cave, C. J. P.
Corless, R.
Curtis, J. A.
Darwin, Sir G. H.
Dickson, Dr. H. N.
Field, Vice-Admiral A. M.
Gold, E.
Harding, C.
Harding, J. S.
Harries, H.
Harvey, Captain J. M.
Hayes, W.
Heinemann, C. W.
Hepworth, Commr. M. W. C.
Howard, A. G. W.
Humphreys, Miss E. C.
Inwards, R.
James, W. G.
Keeton, H.
Kitto, E.
Lempfert, R G. K.
Marriott, W.
Mellish, H.
Middleton, Prof. R. E.
Niven, Prof. C.
Powers, L. H.
Poynting, Prof. J. H.
Rawson, Col. H. E.
Rücker, Sir A. W.
Sargeant, R.
Scott, Dr. R. H.
Shaw, Dr. W. N.
Sheerman, J.
Sidgreaves, Rev. W.
Simpkins, A. R.
Smith, Miss R. E.
Snell, F. W.
Strachan, R.
Tarrant, H. L. B.
Thompson, C. H.
Towse, J. Wrench.
Turney, Miss A.
Wallace, R. F.
Williams, J. T.

It was agreed to proceed with the work.

290. *Forecasts.—Application to the Commissioners of the Development Fund* (Minute 281).—Submitted—the following final draft of the application which was circulated to members of the Committee on 9th February, approved in accordance with Minute 274 on the 10th, and sent to the Treasury on 22nd February :—

SIR,

THE Meteorological Committee beg leave to make application for a grant of £5,000 per annum for five years from the Development Grant, in order that a daily forecast of the weather, transmitted by telegraph, may be exhibited at the post offices of the towns and villages of the United Kingdom, and thus brought effectively to the knowledge of the public most closely dependent upon the weather.

The application is made on the ground that the benefit to the community of the available official information as to weather-prospects would be materially increased if suitable provision were made for its distribution.

Agricultural and fishing communities are most directly concerned, but the question of the general distribution of forecasts has been suggested to the Office from time to time in connexion with the work of municipal engineers, electric lighting companies, meat merchants, provision merchants, ice merchants, and other trades and occupations.

The system of daily forecasts of weather by means of synoptic charts based upon telegraphic reports was developed in Europe and America between 1860 and 1880, and has been adopted by all civilised countries. In the United Kingdom government provision has been made for the preparation of forecasts and for their issue to newspapers regularly since 1879.

The preparation of the forecasts is conducted upon a similar system all over the world, but there is no such uniformity as regards the distribution of forecasts. In the United Kingdom the distribution is left to private enterprise and private cost. Forecasts prepared in the evening are issued without charge to the press, and appear in nearly all morning newspapers ; but by this method of distribution the information takes at least 12 hours to reach the readers, and it fails to reach those who, for the reason of distance or otherwise, do not take a daily paper. Forecasts prepared in the morning and issued to newspapers and press agencies do not reach the rural districts until the work of the day is over.

In the United States, Germany, and Denmark, as the Committee are informed, the distribution of forecasts is regarded as an essential part of the public organisation. It consists partly in the transmission by telegraph of forecasts for exhibition in telegraph offices, and partly in the distribution by rail of charts for exhibition at railway stations.

Authority has already been given by the Postmaster-General for the exhibition at post offices of forecasts sent by telegram "if space allows." Provision for the cost of transmitting the messages alone is wanting to complete the organisation.

The procedure followed at the Meteorological Office is as follows :—

Simultaneous observations made at 7 a.m. over Western and Northern Europe and the Atlantic islands are reported by telegraph to the Meteorological Office, and charted and arranged there between 7.15 a.m. and 9.30 a.m.

A sheet of weather forecasts is prepared at 9.30 a.m. and is ready for issue by 10 a.m., giving—

(*a*) forecasts for the several districts of the British Isles for the 24 hours commencing at noon,
(*b*) the further outlook.

The last is given when the meteorological conditions are held to justify a forecast beyond the limit of the 24 hours.

The procedure in the case of the evening observations, taken at 6 p.m., is similar ; the sheet of forecasts is ready for issue at 8 p.m.

A specimen sheet of forecasts in the usual form is attached hereto.

The Committee propose to issue the morning forecast by telegraph. The messages would be ready for transmission by 10 a.m.

The sum asked for would be wholly expended in defraying Post Office charges for transmitting the messages by telegraph. The post offices selected for exhibition of the information would be arranged in groups according to the districts in which they are located, and the appropriate forecasts, with the further outlook (if any), would be transmitted to them each morning at 10 a.m.

The chief reason for urging a trial of this mode of distribution for a period of five years as compared with distribution by private enterprise is that in spite of the fact that they have been prepared and issued regularly twice a day, and in the summer three times a day, for thirty-one years, the use of weather forecasts is still a novelty, which requires to be put to the test of practicel experience extending over a long period before its economic value can be realised.

The Committee have abundant testimony as to the accuracy of the Office forecasts ; they are concerned in their present application with their practical utility.

It is necessary to draw a distinction between the accuracy and the utility of forecasts. Any reader of a newspaper can form an opinion as to their accuracy by comparing the anticipation with actual experience, but he cannot judge of their utility because, as published in the newspapers, the forecasts only reach him when a large part of the period to which they refer has already elapsed. Nor can a satisfactory judgment as to utility be formed except by the regular daily use of the forecasts for a long period. The distinction is made clear by the experience of the Office with regard to the forecasts prepared since 1879 in the afternoons during the hay and corn harvests, for which farmers and others interested in agriculture are accustomed to subscribe for periods ranging from a few days to some months. It is the practice of the Office to ask from the recipients of these forecasts a statement of the weather experienced, with a view to checking their accuracy, with which the Office is primarily concerned. The remarks which accompany these schedules when they are

returned to the Office refer almost always to the accuracy of the forecasts, and seldom to their utility, and, on the other hand, if inaccuracy is remarked upon there is no reference to loss experienced on account of too trustful a reliance upon the forecasts. It is fair to conclude that the short periods are not long enough to enable the recipients to get beyond the stage of curiosity with regard to the forecasts, and, upon consideration, it would naturally require a lengthy experience for a farmer to feel himself justified in using a forecast received by telegram if it were in conflict with his own judgment as to the weather prospects at the time.

There is another reason why an effective trial of official forecasts requires long continuous experience. On the average, out of 365 forecasts issued in a year, 328 are more nearly right than wrong, but 37 are failures, partial or complete. In some circumstances the impression produced by one failure may easily outweigh that of nine complete or partial successes; there is a better chance of 37 failures being estimated at their true value in relation to 328 successes; still more of 1,640 successes being brought into proper relation with 185 failures. On that account the Committee ask for a trial extending over five years.

The distribution by telegraph would react to some extent upon the weather service itself. The Committee have used every endeavour to improve the material for trustworthy forecasts by the addition of telegraphic reports from Iceland and the Faeroe Islands in the north, from Gibraltar and Madeira in the south, and from Atlantic liners by wireless telegraphy from the west.

The sheet of weather forecasts for a single day is the joint result of the co-operation of some 200 persons, including observers, telegraphists, captains of ships, wireless operators, draughtsmen, and forecasters, in addition to the organisations with which the different units are associated.

New suggestions of various kinds with regard to forecasting weather have been made on the Continent and in this country. The passing of the service from the stage of public curiosity to that of general public utility must necessarily tend to encourage the sense of solidarity and responsibility among all the co-operating factors, and must lead more speedily to any further improvement of which the system is capable.

The direction in which improvement may be looked for is in giving more serviceable indication of the sequence of weather conditions in relation to the period to which the forecast refers. The morning forecast relating to 24 hours from Noon, includes night, with portions of two days, viz.: to-day and to-morrow. The direct practical application of the forecasts will encourage the drawing of a distinction between "to-day" and "to-morrow" whenever the meteorological conditions make such a distinction possible.

Besides being communicated to press agencies which transmit them by telegraph to many provincial newspapers, forecasts are supplied at 9 a.m. daily to the Admiralty for transmission by telegraph to the naval authorities at Sheerness, Dover, Portland, and Devonport, and fron January 1st of the current year, at the request of the Admiralty, a special weather report and forecast are supplied each evening for transmission to H.M. Ships in home waters. Forecasts are also sent daily by telegraph direct to a few health resorts.

The proposal to extend the daily distribution by telegraph is made in the interest of the public generally. It is difficult to name any section of the public which would not be directly benefitted by the immediate issue of trustworthy information about coming weather. Few persons even among the dwellers in towns are altogether independent of the weather. Reference is here made to certain special cases in which forecasts might be of immediate economic value, independently of personal comfort or convenience.

In agriculture the total of losses on account of the vicissitudes of weather would work out at a very large percentage of the total value of the realised produce of the land. Among the causes of these losses we may reckon the destruction of lambs by snowstorms, of fruit and potatoes by frosts, and the loss of crops by inclement weather during harvest, as being items which come within the range of a daily forecast, and if only a small percentage of average losses could be saved by special care in such matters it might mean in many cases the difference between a loss and a profit on the year's working.

Since the practice of notifying spells of fine weather during the hay harvest season was introduced in 1907, the Committee have received from a Cornish firm repeated assurances that the Office forecasts have meant to them the saving of hundreds of pounds, and if that is possible for one firm, the extension to the country generally would certainly be remunerative.

Those whose business is concerned with the food supply of large towns are conscious of the effect of the weather in respect of the loss of perishable goods by bad keeping weather, or by delays on the railways due to fogs or snowstorms, and of the necessity for adjusting the supply according to the character of the weather. A letter recently received from a firm of provision merchants explains the position:

> "Information in regard to the probable course of the weather is very valuable to them
> "(our Irish shippers) and to us at this time of the year (February): it guides our buying."

The necessity for forecasts for municipal engineers and road surveyors, in order to adjust their work in watering and cleansing roads, &c. to the requirements of the weather has been recently set out in letters and editorial articles in the "Surveyor and Municipal Engineer," and attention has also been called in an article on colliery explosions in "Nature" to the desirability of forecasts for colliery managers.

For the fishing industry and small coasting craft generally daily forecasts are likely to be of real service as an extension of the service of storm warnings, which has been carried on at the public expense since 1861. For reasons into which it is not necessary to enter, the issue of isolated notices of warning has many elements about it which are unsatisfactory. A regular daily telegram giving the course of the weather would form a connected story, which would render the warning intelligible on many occasions when without any such story the meaning of the warning cone is likely to be misunderstood. The daily forecast would in this way greatly enhance the efficiency of the provision for preventing loss of life and property at sea. The fact that the Admiralty make such extensive use of the facilities of the Office for the information of the officers of H.M. Navy may be cited as evidence

of the necessity for similar information for the smaller craft, which carry many valuable lives, and are much more dependent upon the weather.

The advantage of distributing weather information by public agency is that it thereby becomes public property, and can be handed on by anyone, postman, messenger, or passer-by, who cares to take a copy of the message. Assuming that the distribution of the messages to the telegraph offices would cost £5,000, the information might be expected to reach many thousands of persons within a few hours, yet the cost would be about the same as that of sending, under present conditions, a forecast to 500 "subscribers" under the pledge of telegraphic secrecy. It is clear that for the sum spent the distribution on the public service is immeasurably more effective than distribution by private enterprise, on account of the greater publicity which is secured.

Similarly, a general distribution is more effective than distribution to a few selected centres. The utility of forecasts is very much dependent upon the occasion. There are, for example, harvest seasons when the weather is so unsettled that a forcaster can do little to help the agriculturalist; his forecasts may be accurate, but the weather unsuitable. But for just the same reason he might be the means of saving the lives of many fishermen, and, incidentally, he might be of considerable service to motorists. The wants of the community are so diversified that if the information is placed at the service of the public generally, and is accurate as far as it goes, there will be no day in the year when there will not be found a sufficient number of persons to profit by it, and the daily forecast may in course of time come to be regarded as useful in the same sort of sense as the finger-posts on the high roads.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W.

Read—the following letters :—

From the Treasury (M.O. 863)—

Treasury Chambers,
8th March, 1911.

SIR,

I AM directed by the Lords Commissioners of His Majesty's Treasury to acknowledge the receipt of your letter of the 22nd ultimo with enclosure making application on behalf of the Meteorological Committee for an advance under Part I. of the Development and Road Improvement Funds Act, 1909, in aid of the distribution of weather forecasts, and I am to request you to inform the Committee that My Lords have caused the application to be forwarded to the Board of Agriculture and Fisheries as the Government Department concerned for transmission to the Development Commissioners in accordance with Section 4 (1) of the Act.

I am, &c.,
T. L. HEATH.

The Director,
Meteorological Office.

From the Post Office (M.O. 1089)—

General Post Office, London,
30th March, 1911.

SIR,

WITH reference to your letter of 8th December last, I am directed by the Postmaster-General to say that the number of Country Sub-Offices in Great Britain and Ireland is so great—8,218—that he fears the cost of a Daily Telegram to each Office throughout the year would be considered prohibitive. Taking the average number of words at 15 for the text and two for the address, the cost would be for the telegrams alone—exclusive of any special attendance which might be required at the Offices concerned—£106,234 for a daily service, or £91,099 for a service on week days only.

It is thought, however, that it may be of interest to you in this connection to see the letter, of which I enclose a copy, and in which an estimate was furnished in 1882 to Mr. Thomas Earp of the cost of supplying weather forecasts for two months in the year to the more remote villages only.

The Postmaster-General will be happy to supply, if you desire it, an estimate of the present cost on these or similar lines.

I am, &c.
MATTHEW NATHAN.

The Director,
Meteorological Office.

General Post Office, London,
22nd July, 1882.

DEAR MR. EARP,

WITH reference to your letter of the 14th instant, I should explain that the total number of Telegraph Offices is about 5,600. The number of towns publishing newspapers to which news is sent by telegraph is about 350. If for these towns and the villages which are so near the large towns that they would not require Forecasts we deduct 2,000, there still remain 3,600 offices, and I presume that what you wish to know is, what would be the cost of supplying Weather Forecasts to all these villages for two months annually.

The Hay Harvest Forecasts of the Meteorological Office are handed in at 4 p.m. every day for five or six weeks, commencing about the middle of June. If the telegrams to which you refer are the same kind of telegrams, I presume one would be sent every day except Sunday. The charge for one day's telegrams will be 3,600 shillings, or £180. At this rate the charge for distributing the telegrams for the two months, August and September, would be about £9,540.

The cost of supplying similar telegrams for a whole year would depend upon the number of messages despatched, and whether they were sent daily.

H. FAWCETT.

T. Earp, Esq., M.P.

London Stations for the Daily Weather Report.—Reported—that the Trustees of the British Museum had given permission for a thermometer screen and rain gauge to be placed on a grass plot in the grounds of the Natural History Museum and that observations at 6 p.m. for the customary reports to newspapers had commenced on 1st March. B.M. (N.H.) 32/11. M.O. 525.

The permission is provisional and the Trustees reserve the right to withdraw it at their pleasure.

Telegrams from Iceland.—Reported—that in view of the approaching termination of the agreement of October, 1906, for five years with the Danish Government and the Great Northern Telegraph Company for the transmission of weather telegrams from five stations in Iceland (Case T.C. 02, Minutes 96, 100) the London representative of the Company had called and suggested that the Office should continue the agreement on the present lines subject to termination by six months notice on either side. The agreement includes the payment of 6,000 francs a year by the Office of which £200 a year was provided by an increase of the Parliamentary grant by that amount for the five years commencing with 1907–8.

The Director was authorised to notify to the Company that the Committee are prepared to continue the agreement on the terms suggested.

291. *Branch Office at South Farnborough.*—Reported—the following letter (M.O. 574) and enclosure from the Treasury :—

2283/11. Treasury Chambers,
10th February, 1911.

SIR,

I AM directed by the Lords Commissioners of His Majesty's Treasury to transmit herewith, for your information, a copy of a letter, dated the 3rd instant, which they have received from the Army Council, relative to the proposed establishment of a branch of the Meteorological Office at the Balloon Factory, South Farnborough, and I am to request that My Lords may be favoured with any observations which you may have to offer on this proposal.

I am, &c.,
G. H. MURRAY.

W. N. Shaw, Esq., Sc.D., F.R.S.,
Director of the Meteorological Office,
Exhibition Road, S.W.

War Office, London, S.W.
3rd February, 1911.

SIR,

I AM commanded by the Army Council to request that you will inform the Lords Commissioners of His Majesty's Treasury that they have had under consideration the best method of obtaining accurate meteorological information for use in connection with aeronautical work.

After consultation with the Director of the Meteorological Office the Council have come to the conclusion that it is desirable to establish a branch of that Office at South Farnborough within the precincts of the Balloon Factory. They therefore propose to sanction the following arrangements :—

(1) Office accommodation, together with the necessary furniture, and with certain laboratory apparatus which is to be purchased at an estimated cost of £175, will be provided from Army Funds at the Balloon Factory for a trained observer, appointed and paid by the Meteorological Office.
(2) The observer will furnish the Military Authorities with any information which they may require, but will be at liberty to carry out observations, and to use the apparatus on behalf of his own Department.
(3) A Laboratory Assistant (boy) will be provided by this Department.
(4) Such repairs of apparatus as are necessary will be carried out in the Factory, the cost being borne by Army Funds.
(5) In the event of this arrangement with the Meteorological Office being terminated, any plant, buildings, &c., provided out of Army Funds will, of course, remain the property of the War Department.

I am to say that no additional cost on account of buildings or apparatus will be incurred as a consequence of the proposed arrangement, as the scheme for new offices at the Balloon Factory, now under consideration, includes provision for meteorological work, while the pay of an expert will be saved.

The Army Council will be glad to receive Their Lordships' sanction for these proposals.

I am, &c.,
R. H. BRADE.

and the following reply a draft of which had been circulated to the members of the Committee on 16th February and corrected in accordance with the suggestions received :—

Meteorological Office,
South Kensington London, S.W.,
21st February, 1911.

SIR,

I HAVE the honour to acknowledge the receipt of your letter (2283/11) of the 10th February, 1911, requesting observations on the proposal of the Army Council with regard to obtaining accurate

meteorological information for use in connexion with aeronautical work. In reply thereto I beg leave to submit the following observations for Their Lordships' consideration.

According to the proposal outlined in the War Office letter 87/160 (M.G.O.F.), a branch of the Meteorological Office is to be established at South Farnborough, the War Department providing office accommodation, including, presumably, laboratory accommodation, and certain other facilities, the Meteorological Office providing a trained observer and directing the work.

The primary object of the arrangement is that the Balloon School may be provided with necessary information about existing atmospheric conditions, and may have the advice of a trained meteorologist in the practical application of the information of various kinds available in regard to the prospects of coming weather.

Having regard to the conditions of service in the Army it is thought better for this work to be done by a civilian, looking to the Meteorological Service for his pay and prospects of promotion, rather than by an Army Officer with special training in Meteorology.

The Meteorological Office is concerned to collect information that may be useful to the public, and to increase our knowledge of the atmosphere by the special investigation of the upper air, or in any other way that may prove useful to science now and to the public hereafter. Subject to the consideration of the provision of the necessary funds, a Branch Office at Farnborough immediately concerned with the practical application of Meteorology to aeronautics would certainly be regarded as an opportunity for extending the work of the Office, with a promise of usefulness, both to the science of Meteorology and to all those interested in aeronautics.

No provision has been taken in the Estimates of the Meteorological Committee, already presented to their Lordships, for a Branch Office at South Farnborough. The Meteorological Committee rely for the provision of a "trained observer" at Farnborough upon a grant of £250 from the Advisory Committee for Aeronautics, made for the continuation of experimental work in Meteorology, which was begun in the current year by Mr. J. S. Dines under the direction of the Meteorological Office, at Pyrton Hill, Watlington, where his father, Mr. W. H. Dines, F.R.S., has conducted experimental investigations of the upper air for the Office since 1906.

The Advisory Committee for Aeronautics have approved of the transfer of this experimental work from Pyrton Hill to Farnborough in the year 1911–1912, and have allowed the grant of £250 to stand in order to enable the Meterological Committee to carry out the proposal of the Army Council, although the work for the Balloon School is not confined to the experimental programme of the Advisory Committee.

The Meteorological Committee cannot regard as permanently satisfactory an arrangement by which a branch of the Office is maintained upon the premises of another Government Department by means of funds controlled by a third body.

No detailed investigation has yet been made to ascertain whether the accommodation offered by Army Council is appropriate to the requirements of a branch of the Meteorological Office.

The combination of scientific training, experimental skill, and meteorological experience, required for the trained observer, is not easily found, and the sum available from the grant of £250 cannot be regarded as sufficient to retain the services of a man of the scientific attainments which are absolutely necessary to secure the desired advantage to the Aeronautical Service. In view, however, of the importance of accurate meteorological information in connexion with aeronautical work and the difficulty of framing a final scheme without some experience to go upon, the Committee think that the interests of the public service leave them no alternative but to endeavour to carry out the proposal of the Army Council to the best of their ability with the means at their disposal, and they are prepared to make the attempt on the terms indicated.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W.

With reference to this reply a letter was received from the Treasury on 3rd March (Treasury 3435/11) enclosing a copy of the following letter to the War Office :—

Treasury Chambers,
2nd March, 1911.

SIR,

IN reply to Mr. Brade's letter of the 3rd ultimo (87/160 M.G.O.F.), I am directed by the Lords Commissioners of His Majesty's Treasury to request you to inform the Army Council that They sanction, as an experimental measure, the proposed arrangements for the establishment of a branch of the Meteorological Office at the Balloon Factory, South Farnborough, with a view to obtaining meteorological information for use in connexion with aeronautical work.

I am, &c.,
G. H. MURRAY.

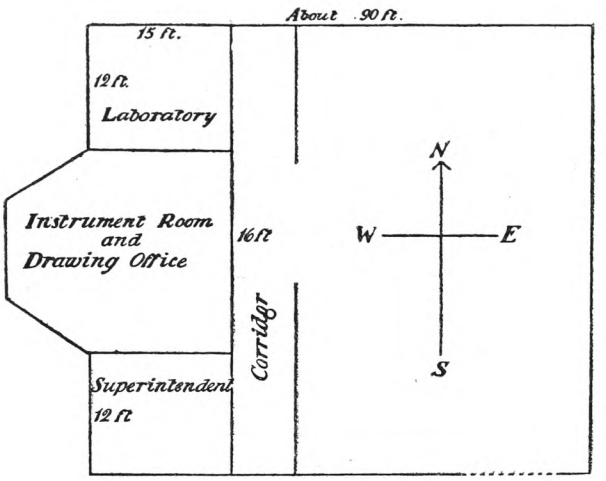
The Secretary,
War Office.

The Director reported further that at the request of Major-General Hadden, the Master of the Ordnance, he had visited the Balloon Factory at Farnborough on 21st March to confer with Mr. O'Gorman about the accommodation to be provided for the observer, and had made the following notes :—

It is proposed to assign three rooms on the first floor of an office block, making about 40 ft. × 15 ft. taken together.

The block will be in the front of the new factory with the new (100 ft.) dirigible shed, about a quarter of a mile away on the west, the Beta shed to N.W. with gasholders near by. Open land with fair horizon to S., S.E. and S.W. Interrupted from W. to E. round by N. by buildings, and from E. to S.E. by trees. The use of two theodolites would be possible to S. and W. or just short of it.

Laboratory to be fitted with lathe and hand tools. Anemometer pole, a ship's mast 80 ft. high, with crow's nest. An upper mast of 60 ft. may be provided. Pilot balloons would be invisible at considerable altitudes unless they were observed from a platform on the roof, say at 25 ft.



Screen for thermometers, rain gauge, &c. in an enclosure about 40 ft. wide in front of the range of balloon-making sheds.

The site is not one which would commend itself as a meteorological observatory. It would be necessary for the observer to have outlook to S. and W. and access to a roof platform for his theodolite.

The Director reported further that after consultation with Dr. Glazebrook, Chairman of the Advisory Committee for aeronautics, he proposed to ask Mr. J. S. Dines to undertake the work of the Branch Office at a salary for the year 1911–12 of £200.

Approved.

292. *Fishery Barometers for Irish Ports.*—Read—M.O. 1032, 1033 from the Department of Agriculture and Technical Instruction (2328/11 F.B. and 2015/11 F.B.)

M.O. 1032. Department of Agriculture and Technical Instruction (Fisheries Branch),
3, Kildare Place, Dublin.
22nd March, 1911.

SIR,

I AM directed by the Department to state that they have been approached with the view of securing the supply of barometers for the use of fishermen at Cloghy, Portavogie, Clogher Head, Loughshinny, Ballyhalbert and Rosslare. The Department consider that instruments would be useful at these places.

If the Meteorological Office could see their way to accede to the requests, the Department would suggest that ships' aneroid barometers with large dial and scale would prove the most useful.

On the attached sheet are shown the arrangements that could be made for undertaking the charge of the instruments, entering the readings on the charts and forwarding the charts to the Meteorological Office.

I am, &c.,
M. P. DOWLING.

The Director,
Meteorological Office, London.

ARRANGEMENTS THAT COULD BE MADE FOR UNDERTAKING THE CHARGE OF INSTRUMENTS, ENTERING THE READINGS ON CHARTS AND FORWARING CHARTS TO THE METEOROLOGICAL OFFICE.

Cloghy.—The Coast Guard Officer at Cloghy is prepared to house the instrument and look after it, and also to forward the charts monthly to the Meteorological Office.

Portavogie.—Mr. Cully, Merchant, of Portavogie, is prepared to house the instrument, look after it and mark the charts, and forward the latter monthly to the Meteorological Office.

Clogher Head.—The barometer could be erected in the watch-room of the Coast Guard Station at Clogher Head. The chart would be marked by the watchman. The Department would undertake to secure the erection of a case for the exhibition daily on the Pier of a copy of the chart.

Loughshinny.—The Coastguard Officers at Loughshinny are prepared to house and take charge of the instrument and forward the charts monthly to the Meteorological Office.

Ballyhalbert.—Mr. J. McAdams, the Harbour Master at Ballyhalbert, is willing to look after the barometer, to mark the charts and forward them monthly to the Meteorological Office. It is proposed to place the instrument in a window of a Store belonging to Mr. McAdams, which is situated about 200 yards from the Pier. The window requires some small alterations to accommodate the barometer, and the Department will hold themselves responsible for having this done.

Rosslare.—If the instrument were fitted and supplied in a lock-up case, it could be erected at the gate of the Coast Guard Station, where it could be consulted by the public at all times. The Coast Guard Officers are prepared to undertake the setting and reading of the instrument, and also the entering and forwarding of the charts.

M.O. 1033.

Department of Agriculture and Technical Instruction (Fisheries Branch),
3, Kildare Place, Dublin,
22nd March, 1911.

SIR,

I am directed by the Department to state that there is at Balbriggan a barometer which was supplied by and formerly tended at the expense of the Royal National Life Boat Institution. Provision for a chart has been made in the case of the instrument, and the officers of H. M. Coast Guard at Balbriggan are willing to mark the charts provided they are put to no expense in forwarding them to the Meteorological Office.

The Department would suggest that a supply of charts and addressed envelopes should be forwarded to the Chief Officer of Coast Guard at Balbriggan. It is assumed that postage on letters addressed to the Meteorological Office need not be prepaid.

I am, &c.,
M. P. DOWLING

The Director,
Meteorological Office, London.

It was agreed to reply that mercury barometers could be lent for the stations named in the letter in accordance with the regulations for the loan of fishery barometers.

It was also agreed to supply forms for the barometer in charge of the Coast Guard at Balbriggan, and to explain to the Board the objects for which the chart is kept.

293. *Office Staff.—Voluntary Assistant.*—The Director reported—that he had been applied to by Mr. Walter Braby, Heathside, Redington Road, Hampstead, to give a trial, on probation, with a view to a clerkship, to his son, Herbert Wilson Braby, 23 years of age, B.A. of Sidney Sussex College, who left Cambridge in June, 1910, with the ordinary degree and a diploma in geography, including climatology, and that upon receiving testimonials from the Tutor of Sidney Sussex and Mr. B. W. Risk, he had accepted Mr. Braby as a voluntary assistant on trial without pay till 30th September, 1911, and had provisionally assigned him to the forecast division.

Boy Clerk.—The Director reported—that in view of a probable vacancy in April he had arranged at the examination in December last to take, as boy clerk, M. H. Megrah, born February 5th, 1896, who was first in marks in the examination, but under the prescribed age, and that the appointment, in accordance with the arrangement, dated from April 3rd, 1911.

Approved.

294. *Publications.*—Reported—that of the 12 pages monthly of the *Observations at Stations of the Second Order* for the year 1911, eight pages had been filled with observations of the usual type from sixteen stations, and the title had been altered to *Daily Observations at Stations of the First and Second Orders*, and that out of the remaining four a new section of the *British Meteorological and Magnetic Year Book* had been compiled containing daily data as to Meteorology, Atmospheric Electricity, Terrestrial Magnetism and Seismology at the three observatories belonging to the office, together with the resolved components of wind at the four principal anemograph stations of the office, Deerness, Yarmouth, Holyhead and Scilly, and called the *Geophysical Journal*. Copy for the new section had been sent to the printers, and a revise was submitted.

The preparation of the copy for the January section of the *Hourly Readings* was in progress. The Hourly Meteorological data for Kew, Eskdalemuir and Valencia would form the immediate issue, and the corresponding data for terrestrial magnetism and atmospheric electricity at Eskdalemuir would be reserved for publication with summaries of hourly values at Falmouth and Aberdeen at the close of the year.

Approved.

295. *Director's Report and Accounts :—*

New Reading Apparatus for Mercury Barometers.—At the wish of the Director, after many consultations with Mr. H. Darwin, of the Cambridge Scientific Instrument Company, a specimen attachment to a mercury barometer of the Kew pattern, which, when set in the ordinary way, shows the reading on a dial instead of requiring the use of a vernier, has been made by the Company, and is submitted for inspection. In the course of the discussion of the best arrangement for securing this object, which is a very desirable one in view of the possibility of using instruments graduated according to C.G.S. units, a rough model was made in the Office and came under discussion, but the mechanism of the new design is of a different character. The Instrument Company desire to protect the invention before placing it on the market, and Mr. Darwin has raised the question whether he is entitled to sign the declaration that the invention is his own in view of the numerous discussions of the design that have taken place.

The interest of the Office in the matter is that the new or improved instruments should be available for the use of their Observers and for the general public at cheap rates, and in so far as

protection prevents the wider distribution of a good instrument, it is not in the Office interest. At the same time no instrument maker will devote time and expense to perfecting an instrument, unless he is reasonably protected from the competition of copies or slight modifications. The Office is much indebted to Mr. Darwin for working out the mechanical details of the apparatus which will probably be found to be generally acceptable, if it is not too expensive, and the proper course would be for the Office to say that it is not opposed to the grant of a patent to the Instrument Company for the invention if other instrument makers are licensed to make the apparatus or the Office is allowed to buy the apparatus on dealer's terms.

Falmouth Observatory.—The Secretary of the Royal Polytechnic Society of Cornwall, to which the Falmouth Meteorological and Magnetic Observatory belongs, applied in January for support in his application to the Government Grant Committee for £70 to supplement a grant of £25 from the British Association to enable the Society to carry on the magnetic work in the current year. The meteorological work is carried on by means of a subvention of £250 from the Office. The ground for the continuance of a grant for magnetism has been that the Observatory was wanted to bridge over the time between the disturbance of Kew and the introduction of Eskdalemuir in its place. Notice has been given to the Secretary that the question of the necessity for the continuance of the elaborate process of photographic recording as regards meteorological elements has been raised on several occasions, and the whole question of the position of the Observatory with reference to the grants must be revised. The grant has been made by the Government Grant Committee for this year, on condition that the question shall be considered and reported upon. It would appear that the time is ripe for a change of duty at observatories like Falmouth, and for the introduction of the new methods of pilot balloon and cloud observations, and for the simplification of the methods of recording meteorological elements. Arrangements have been made for a visit to Falmouth to discuss these matters early in May.

Pilot-balloon Theodolites.—It has been necessary to arrange for the manufacture of a number of special pilot-balloon theodolites. Two are required for the Advisory Committee for Aeronautics, and one for Mr. Cave, and two for Aberdeen, in order to carry out a suggestion for observations on the towers of Marichal and King's Colleges. After discussions with Dr. Glazebrook, Mr. Dines, and Mr. Cave, a pattern has been agreed upon with Messrs. Cary Porter, and the price, £29 16*s.* each, has been fixed, on the understanding that a considerable number of instruments will be ordered together. Taking into account the probable requirement of Falmouth and Valencia, orders have been given for eight instruments, of which the Office will be responsible for four.

Attendance fee at Central Criminal Court.—Messrs. Lumley & Co., solicitors for Morrison in the case of Rex *v.* Morrison, represent that they were only able to obtain a fee of £1 1*s.* from the Court for the attendance of a representative of the Office who was requested to attend but not served with a subpœna and not called.

The acceptance of the sum in the circumstances detailed in MO. 916 (2) was authorised.

Library.—The following rules have been drawn up for the use of the Library :—

Cir. E 06. METEOROLOGICAL OFFICE LIBRARY AND MUSEUM.

THE LIBRARY.

The Library consists of—

(1) published meteorological and magnetic data of all countries,
(2) meteorological journals, pamphlets, and text books,
(3) general scientific works and other books of reference,
(4) manuscript registers of meteorological observations, logs, data books, original records from instruments, tabulations of the records, &c.

Distribution.—The books and manuscripts are placed in the Office as follows :—

Room.	Weather reports, Year books, and other meteorological registers, published or in manuscript.	Discussions, &c.
Museum : Bay i ...	North and Central America	Meteorology of the sea. Polar exploration. Aeronautics.
„ „ ii ...	South America, France, Spain, Portugal, Russia, the Balkans, China, Japan.	
„ „ iii ...	——	Scientific periodicals.
„ „ iv ...	Scandinavia, Germany, Denmark, Netherlands, Austria-Hungary, Italy, Switzerland.	Scientific periodicals.
„ „ v ...	India	Text books—pamphlets : General Physics. Magnetism. Seismology.
„ „ vi ...	British Empire, Africa, and Mediterranean.	
No. 25	Collection of published synchronous charts, and manuscript working charts of the Office since 1867.	
Corridor	Supplementary collection of synchronous charts. Duplicate volumes.	

Room.	Weather reports, Year books, and other meteorological registers, published or in manuscript.	Discussions, &c.
No. 22	Meteorological Log books— 1854 or earlier, to 1876.	
No. 18	1877 to 1899.	
No. 16	1899 to date.	
No. 8 and Corridor	Manuscript books of data for the various 10° Squares of Marsden's Chart, extracted from the Meteorological Logs.	
——	Manuscript registers from the Atlantic Ocean, Mediterranean, and Indian Ocean, since 1901 (not yet arranged).	Tabulations of wind data (in bundles not yet arranged).
No. 14	Manuscript meteorological registers and journals from British, Colonial, and Foreign observatories and stations.	
No. 5	Original records from normal observatories, and from self-recording instruments at other stations.	
No. 2 (Basement) ...	Sunshine records.	

Custody of the books and documents.—The books, documents, and records in the several rooms are in the custody of the Librarian-assistant, or clerk-in-charge of the room for the time being, who is responsible to the Director through the Superintendent of his Division.

Catalogues and registers.—The catalogue of books is kept by the Chief Librarian.

The register of marine meteorological documents is kept by the Chief Clerk.

The register of original records and tabulations belonging to the Library is kept by the clerk-assistant to the Curator of the Museum. (The original records, with the tabulations, are transferred to the Library in sets for completed years as soon as they have been examined and tabulated and the data prepared for publication).

The list of manuscript registers from climatological stations is kept by the assistant in Climatology.

Rules for the Use of the Library.

Members of the staff of the Office and other persons by permission of the Director are admitted to read in the Library or to borrow books on the conditions set out in the following rules. Tables are provided in the Museum and in Room 25 in order that members of the Office staff and others may consult the books without taking them out of the room.

1. A member of the staff is named as the Librarian in each Room whose business it is to take care of the books and documents in the room.

2. Each Librarian is authorised to give access during Office hours to the shelves in his charge in order that members of the staff and others may consult the books there. Visiting readers are only admitted between 10 o'clock and 4 o'clock. Readers as a rule are limited to the ordinary office hours, but a Superintendent, in special cases, is authorised to arrange with the Librarian for exceptional facilities in respect of hours.

3. No one is allowed to take a book or document out of its proper room without first informing the Librarian of the room, and giving a written receipt for it. A suitable book is to be kept in each room for the purpose, and to be sent up to the Director for inspection on the first day of each month.

Reference Library.

4. Books of manuscript or printed data, original records, and tabulations, and all other books and documents not specially marked as belonging to the Lending Library form the Reference Library of the Office, and must not be taken away from the Office without an order or a written permission from one of the Superintendents, which must be given to the Librarian of the room when the book is borrowed, to be transmitted to the Director.

5. No book belonging to the Reference Library is to be retained continuously in any special department. A duplicate copy of a work in the Reference Library may be so retained by arrangement with the Superintendent of the Library.

Books "not to be taken away."

6. Certain cyclopœdias, atlases, and other standard works required for frequent reference will be marked "not to be taken away." They can be consulted at the tables provided for the purpose, but must not be taken out of the room without special order.

7. New books, current periodicals, and other additions to the Library are set out on the Museum tables for a week. They are not to be taken out of the Museum during that period without special order.

Lending Library.

8. A duplicate set of the publications of the Meteorological Office and, as far as practicable of other meteorological books and publications, forms the Lending Library; the volumes are marked accordingly. They may be borrowed from the Librarian for periods specified at the time of lending. The Librarian will keep a list of the books so lent, which is to be sent up to the Director for inspection on the first day of each month.

9. Before the end of June in each year the Librarian is to give notice to borrowers requiring the return of all books to the Library a week before the end of July. No books are to be lent from their proper rooms during the first week in August, and at the end of that period the Superintendent of the Library is to report to the Director any books and documents which are missing.

THE MUSEUM.

The general charge of the Museum and of the instruments in operation at the Office is entrusted to the Superintendent of Instruments as Curator of the Museum, who also supervises the filing and storing of the instrumental records. He is to be assisted by a clerk-assistant who will have a place in the Museum, will keep the catalogue, see to the labelling of the exhibits, and will be Librarian for the original records and tabulations. The Museum is open to anyone by permission of the Director. Visitors to the Museum are expected to sign their names in a book kept by the clerk-assistant.

April, 1911. W. N. SHAW.

Reports of Work.—1. *Marine Division.*—Data for Islands in the Southern Indian Ocean and for Yangtsekiang in preparation for Admiralty. 54 meteorological logs, 1 short log, 5 lighthouse registers, 241 North Atlantic registers, 73 registers for radiotelegraphy, and 42 Indian Ocean registers examined. Issue of the North Atlantic Meteorological Chart for February and March, 1911, completed. April issue begun on 16th March. Indian Ocean Meteorological Chart published for March and April; May and June in the press. Extension of May and subsequent charts to 125° E. (vii.) Preparing reductions of Daily Weather Charts of the Antarctic Seas. The Charts for October to December, 1901, January to October, 1902, and the whole of 1903 are now passing through the press, and the reductions of November and December, 1902, are ready for lithographer. In the press 25 months, ready for press 2 months, still to do 3 months. Preparing mean monthly charts for the period October, 1901, to March, 1904, inclusive, and 12 charts showing monthly averages. Preparing 12 small Globes to illustrate meteorological averages for Coronation Exhibition.

2. *Forecast Division.*—(1) Current work on the Daily, Weekly, and Monthly Weather Reports and on the Atlantic Charts has been kept up to date.

(2) Number of wireless messages received :—

	February.	March.
H.M. Ships	6	9
Mercantile Marine	222	308

Those received from H.M. Ships have been reported each week to the Admiralty.

The carbon duplicates from ships of the Mercantile Marine have been compared with the messages, and errors of transmission have been reported to the captains concerned. The work is now up to date.

(3) Correction to Daily Weather Report for February now with lithographer.

(4) Forecast Checking. The work is completed up to January 19th, 1911. Summary of results for 1910 has been prepared for the Annual Report.

(5) Tabulation of gradient wind velocities for four stations completed up to October 20th, 1910.

(6) Wind frequency tables prepared to end of February, checked to end of October.

(7) Working charts prepared for binding up to November 27th, 1910.

(8) Storm Warning checking; extraction of data completed to end of 1910. Summary of results in preparation.

(9) Harvest Forecast checking for 1910 completed. Results appended.

(10) The number of inquiries answered has been as follows :—

	February.	March.
Prepaid Replies	22	8
Telegraphic Inquiries (application by letter or personal) ...	3	5
Inquiries by telephone	1	2
Notification of special conditions	2	4
Personal (answered immediately)	2	3
	30	22

(11) Admiralty Forecasts.—Daily Forecasts have been sent to—

Admiral Home Fleet, Portland, twice daily since January 17th.

Naval Aeronautical Department, Barrow.

Officers in Command, Devonport, Portland, and the Nore.

H.M. Ships within range of wireless telegraphy.

Two miscellaneous forecasts were required during March.

Expenditure incurred by M.O. on behalf of the Admiralty in sending telegrams amounted to £1 13*s.* 2½*d.* in February and £1 1*s.* 11½*d.* in March.

Harvest Forecasts, 1910.

Results of Checking, from Observations supplied by Subscribers.

District.	Place.	Daily Forecasts.									Extended Forecasts (The Further Outlook).								Remarks.
		No. Checked.	Complete Success.		Partial Success.		Partial Failure.		Complete Failure.		No. Checked.	Complete Success.		Partial Success.		Complete Failure.			
			No.	%	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%		
2	Easingwold, Yorks. ..	5	4	80	1	20	—	—	—	—	4	4	100	—	—	—	—		
	Slaley, Northumberland.	18	6	33	9	50	2	11	1	6	7	2	29	4	57	1	14		
	Appleby, Lincs. ...	9	5	56	3	33	1	11	—	—	6	4	67	2	33	—	—		
	District... ...	32	15	47	13	41	3	9	1	3	17	10	59	6	35	1	6		
3	Weston, Herts ...	60	27	45	29	48	3	5	1	2	30	16	54	10	33	4	13		Special notifications sent July 7 (correct) and July 9 (incorrect).
	Kelling, Cley, Norfolk	78	38	49	28	36	11	14	1	1	35	28	80	2	6	5	14		Special notifications sent July 7 and 9 and Aug. 31 — Sept. 2 (three correct, one incorrect).
	Helion Bumpstead, Essex.	11	6	55	4	36	1	9	—	—	3	2	67	—	—	1	33		
	Oundle, Northampton	28	12	43	9	32	6	21	1	4	12	9	75	1	8	2	17		Special notifications sent Aug. 10 (incorrect) and Aug. 11 (correct).
	District... ...	177	83	47	70	40	21	11	3	2	80	55	69	13	16	12	15		
4	Tibshelf, Derbyshire...	10	4	40	3	30	2	20	1	10	5	2	40	2	40	1	20		Special notifications sent July 7 (correct) and July 9 (incorrect).
	Edgbaston, Warwickshire.	10	8	80	2	20	—	—	—	—	5	5	100	—	—	—	—		
	Ipsden, Oxfordshire...	5	4	80	—	—	1	20	—	—	4	3	75	—	—	1	25		
	Wylde Green, Warwickshire.	15	6	40	7	47	1	7	1	6	8	4	50	—	—	4	50		
	Pinvin, Worcestershire.	6	5	83	1	17	—	—	—	—	4	3	75	—	—	1	25		
	Norton, Salop ...	18	9	50	5	28	4	22	—	—	7	5	71	—	—	2	29		
	District... ...	64	36	56	18	28	8	13	2	3	33	22	67	2	6	9	27		
5	Cothill, Berks ...	12	5	42	6	50	1	8	—	—	4	3	75	—	—	1	25		Special notifications sent July 7 (correct) and July 9 (incorrect).
	East Knoyle, Wilts ...	64	30	47	19	29	12	19	3	5	27	17	63	3	11	7	26		
	Wickham, Berks ...	12	8	67	4	33	—	—	—	—	5	4	80	1	20	—	—		
	Highclere, Hants ...	52	28	54	10	19	11	21	3	6	19	13	68	—	—	6	32		
	Street, Sussex ...	6	2	33	4	67	—	—	—	—	2	—	—	1	50	1	50		
	Shinfield, Berks ...	18	8	44	9	50	1	6	—	—	6	3	50	1	17	2	33		
	District... ...	164	81	49	52	32	25	15	6	4	63	40	63	6	10	17	27		
7	Bell Busk, Yorkshire	30	12	40	12	40	6	20	—	—	14	11	79	—	—	3	21		
	Wilmslow, Cheshire...	18	10	56	5	28	3	16	—	—	8	6	75	1	13	1	12		Special notifications sent July 7 (correct) and July 9 (incorrect).
	Llandudno, Carnarvonshire.	105	58	55	30	29	14	13	3	3	48	36	75	4	8	8	17		Special notifications sent June 14; July 7 and 9; July 11 and 15; Aug. 9 and 11; Aug. 31 and Sept. 2; Sept. 6 and 23; (seven notifications correct; four incorrect).
	District... ...	153	80	52	47	31	23	15	3	2	70	53	76	5	7	12	17		
8	Abergavenny, Monmouthshire.	12	4	33	5	42	1	8	2	17	5	1	20	2	40	2	40		Special notifications sent Aug. 9 and 11 (both correct).
	General Results...	602	299	50	205	34	81	13	17	3	268	181	67	34	13	53	20		

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, Parts I., II., up to date. Part III., January issue nearly complete. Usual work for library. Inquiries (February and March, 1911) as follows:—Newspapers, 14; Legal, 25; Scientific and Commercial, 95; Forecasts, 5; General, 16. The receipts in connexion with these amounted to £14 9s. 4*d.*

4. *Instruments Division: Observatories.*—Preparation of Part IV. of Year Book for printer:—the Hourly Readings for December and the Appendix, 1910, have passed through the press; the Means for the January, and most of the February, 1911 issues, are ready for the printer.

From 1st January, 1911, Eskdalemuir has forwarded hourly readings; they are being dealt with in the same way as those received from the other Observatories.

The remainder of the sunshine cards for the 31 years 1880–1910, have now been sorted, put into boxes, and labelled.

The examination of the Observatory returns, checking the measurements of the sunshine cards, and tabulation of the rainfall and wind records, have been kept up to date.

The curves and tabulations received from the Observatories have been satisfactory.

Instruments.—The usual Admiralty and office work.

Storm cones have been renewed at Ardrossan, Stromness, and Pembrey, and a new cone sent to Blyth.

Instruments have been supplied for a new office station in the grounds of the Natural History Museum, also a complete set of instruments for a new telegraphic reporting station at Lerwick.

The following have been supplied with instruments against repayment:—

C. F. C. Padel, Esq., Ashby-de-la-Zouch.
J. C. Pybus, Esq., Yorkshire, for F. D. Harford, Esq., C.V.O.
Edinburgh Academy.
Messrs. Bowles Brothers, Shipowners.

Two requisitions have been received from the Crown Agents for the Colonies:—Hong Kong and S. Nigeria.

Two Colonial requisitions and part of another are in hand.

Observatories (Kew).—The usual routine work has been carried out and tabulated data from the meteorological curves have been sent weekly to the Office.

Observations of the three magnetic elements have been made about once a week, and observations of potential gradient on about half the days.

Observations with the Ångström pyrheliometer were resumed before the end of February, but few opportunities have since occurred for the use of the instrument.

Observations with the Wilson electrometer were discontinued for a fortnight, the instrument being under repair. Since then a good many observations have been made, but the results do not inspire complete confidence.

The caretaker having recovered satisfactorily from his illness, the 10 p.m. observations were resumed in February.

The work of a telegraphic reporting station has gone on uninterruptedly, and data for the new geophysical publication have been got out for January and February.

Experimental observations have been commenced on marine barometers—differing widely in "sluggishness"—supplied by the Office.

Meteorological data for the year 1910 have been extracted for the Mining Engineers, and particulars of 15 magnetic storms have been supplied to Dr. L. A. Bauer, of the Carnegie Institution.

Extraction of fog data for the use of the "Office" has been commenced.

The preparation of the Annual Report for 1910 is approaching completion.

Eskdalemuir.—Meteorological: The normal work has proceeded as before, and no point has occurred requiring special comment.

Magnetic: A number of observations of the Pole Star with the theodolite have been secured. The results so far indicate that, when the instrumental errors have been fully allowed for, there will probably be no serious change in the accepted value of the azimuth of the fixed mark.

The V. F. magnet was readjusted in the beginning of February, and, in addition to its former faults, now shows a slight want of uniformity of scale value. An experimental magnetograph for horizontal components has been under trial. The magnet is 4 cms. long and about 1½ mms. diameter, and suspended by bifilar quartz. A light disc immersed in paraffin oil gives strong damping. The results so far appear very satisfactory.

Seismology: A chain drive for the Galitzin clock was sent from St. Petersburg and seems an improvement on the old string drive. The clock for giving the time marks has given some trouble.

Electricity: The new quadrants for the Zn.-Cu. voltmeter have been put in. The adjustment is now very easy. The instrument was tested by lamp and scale and there is very little difficulty now in getting uniform scale from + to — 1000 volts. A new water-dropping arrangement is to be tried.

Accounts.—Submitted—The following statement:—

	£	*s.*	*d.*
Bank balance on 31st January, 1911	5,229	5	0
Receipts from 1st February to 31st March, 1911	1,460	9	1
	6,689	14	1
Cheques drawn from 1st February to 31st March, 1911	5,419	10	3
Bank balance on 31st March, 1911	1,270	3	10

Submitted—The following Statement of Accounts for the Year ending 31st March, 1911:—

Receipts.						Payments.					
1909–10.				1910–11.		1909–10.				1910–11.	
£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
2,327 10 4	Balance from year 1909–10	—		2,206 14 8		1,000 0 0	Director...	—		1,000 0 0	
15,900 0 0	Parliamentary vote..	—		16,750 0 0							
	M. O. Observatories:						Office Salaries:				
						2,507 15 0	Clerical Staff, monthly	2,865 5 0			
—	Kew	529 16 4				4,347 6 10	„ „ „	4,532 0 5			
—	Eskdalemuir ...	758 0 0				230 6 8	„ „ weekly	269 18 11			
—	Valencia	17 10 0				305 4 6	Messengers „	372 7 2			
				1,305 6 4						8,039 11 6	
	Departmental Expenses Repaid:						M.O. Observatories:				
175 3 4	Forecasts, &c. ...	215 4 0				—	Kew	1,085 2 2			
	Marine, Statistics, and Observa-					—	Eskdalemuir	808 18 5			
83 3 3	tories	92 10 3				—	Valencia	474 8 6			
136 7 6	Instruments ...	139 7 9								2,368 9 1	
				447 2 0		727 0 8	Office Expenses: Rent, Fuel, &c. ...	817 2 8			
	Incidental Expenses Repaid:					123 4 11	Furniture, Fittings, &c.	421 15 5			
365 15 3	Forecasts, &c. ...	375 15 8				277 12 3	Incidental	456 19 3			
98 18 6	Other Branches ...	78 15 3								1,695 17 4	
	Stationery Office						Postage and Telegrams:				
53 4 4	Account ...	47 7 7				270 6 5	General Postage ...	291 17 6			
				501 18 6			Postage of Daily				
	Telegraph Charges Repaid:					317 13 6	Weather Reports ...	343 11 10			
						2,201 7 2	Telegrams, &c. ...	2,338 1 4			
139 18 1	Home	158 13 10								2,973 10 8	
	Telegrams sent						Travelling Expenses				
446 8 11	abroad	349 13 9				341 6 7	and Inspections...	—		327 14 5	
				508 7 7		1,720 13 9	Superannuation ...	—		1,691 0 0	
	Instruments:						Cost of Instruments:				
510 5 5	Royal Navy ...	506 4 6				510 5 5	Royal Navy	506 4 6			
	Mercantile Marine,						Mercantile Marine,				
1,248 9 11	Stations, &c. ...	1,489 10 5				1,779 14 10	Stations, &c. ...	1,865 18 0			
				1,995 14 11						2,372 2 6	
—	Observatory Forms, &c. ...	—		48 2 6							
						3,273 4 2	Auxiliary Observatories, &c.	—		2,484 8 7	
	Superannuation Account:										
566 5 0	Annuities	565 0 0				385 2 8	Lectures and Experiments ...	—		458 3 1	
	Interest on Invest-										
52 19 0	ment	66 5 7					Antarctic Meteorology	—		10 5 2	
9 7 6	Income Tax returned	—				—					
				631 5 7							
							Balance:				
	Lectures and Ex-					2,153 0 4	Cash at Bank... ...	1,270 0 4			
411 3 8	periments ...	—		325 5 8		38 14 4	„ at Office ...	28 15 11			
—	Amount Refunded	—		0 0 10							
						15 0 0	Advance for Inspections	—			
										1,298 16 3	
£22,525 0 0				£24,719 18 7		£22,525 0 0				£24,719 18 7	

Liabilities.				Assets.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
1,437 0 4	To sundry creditors	1,453 8 2		2,191 14 8	By cash at Bank and at Office ...	1,298 16 3	
90 16 8	„ salaries reserved	14 0 6		15 0 0	„ advance for inspections	—	
1,460 17 11	„ balance	522 8 0		228 17 8	„ M.O. instruments in stock	186 14 11	
				553 2 7	„ sundry debtors	504 5 6	
£2,988 14 11		1,989 16 8		£2,988 14 11		1,989 16 8	

Note.—On 31st March the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £3,603 2*s.* 1*d.*

Observatories.—Statement of Accounts for the 9 months ended 31st March, 1911 :—

KEW.

Receipts.	£	s.	d.
Gassiot Trust	212	7	4
National Physical Laboratory ...	281	5	0
Grazing Rents...	1	6	0
Miscellaneous...	34	18	0
To Balance	555	5	10
	£1,085	2	2

Payments	£	s.	d.	£	s.	d.
Superintendent				497	5	0
Assistants				287	7	3
Caretaker...				56	2	6
Sundays and holidays ...	10	15	0			
Overtime	38	7	6			
				49	2	6
Rent, fuel, and lighting				72	10	4
Repairs				7	5	9
Insurance				30	8	6
Materials				37	14	10
Instruments				1	6	5
Books, printing, and stationery				6	18	1
Incidental expenses ...				39	1	0
				£1,085	2	2

ESKDALEMUIR.

	£	s.	d.	£	s.	d.
Aug. 17—						
Royal Society (Parliamentary Grant) ...	250	0	0			
Oct. 28—						
Royal Society (Parliamentary Grant) ...	500	0	0			
				750	0	0
To Balance				50	18	5
				£800	18	5

	£	s.	d.	£	s.	d.
Superintendent				300	0	0
Assistants				172	10	0
Mechanic and Caretaker				81	18	0
Handyman				39	0	0
Books, stationery, &c. ...				20	14	9
Insurance				12	8	6
Travelling expenses ...				14	3	10
Incidental expenses :—						
Rental of private wire	27	15	0			
Instruments and repairs to private wire ...	18	5	8			
Photographic paper ...	28	10	1			
Coals and carriage of coals, light	55	14	7			
Repairs, &c.	6	7	10			
Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	23	10	2			
				160	3	4
				£800	18	5

VALENCIA (12 months).

	£	s.	d.
Grazing rent	17	10	0
To Balance	456	18	6
	£474	8	6

	£	s.	d.
Superintendent	275	0	0
Assistants	121	0	0
Rent, rates, and taxes	22	6	0
Miscellaneous expenses	56	2	6
	£474	8	6

THIRTY-SIXTH MEETING.

South Kensington, S.W., 3rd May, 1911.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

SIR G. H. DARWIN.	THE HYDROGRAPHER.
CAPTAIN HARVEY.	DR. SCHUSTER.

296. The Minutes (287–295) of the last Meeting (5th April, 1911) were read and confirmed.

297. *Sixth Annual Report.* (Minute 288).—Slip proof of the title page, table of contents and other introductory portions with the text of the report and Appendices I–VI, were submitted and approved for paged revise.

298. *New Office.—Post Office Charges* (Minute 289).—Read—the following letter (P.O. 463671/10):—

General Post Office, London,
12th April, 1911.

SIR,

I AM directed to express the Postmaster-General's regret that, through a misunderstanding, the cost of the additional force employed to deal with the whole of the Meteorological telegraph work at the South Kensington Branch Office, was quoted in the Post Office letter of the 10th ultimo, instead of the cost of the special attendance given on behalf of the Meteorological Office outside the usual hours of business.

The cost of the special attendance is £73 1*s.* a year; and a schedule giving particulars is attached.

The Postmaster-General will be willing as an alternative arrangement to provide the Meteorological Office with a private wire (Sounder Circuit) from their Offices in South Kensington to the Central Telegraph Office at a rental of £25 10*s.* a year, or of £37 10*s.* a year if "printers" were provided instead of sounders as in the case of the former private wire. As before, no charge would be made for clerks' services at the Central Telegraph Office.

The Postmaster-General will be glad to know which arrangement you would prefer. If you decide upon renting a private wire the cost of the special attendance at the South Kensington Branch Office, and at the South Kensington Circuit of the Central Telegraph Office, as set forth in the Schedule, will be charged up to the date of the opening of the private wire.

I am, &c.,
H. S. CAREY.

The Director,
Meteorological Office.

STATEMENT of ESTIMATED COST of STAFF, &c., during EXTENDED HOURS in connexion with METEOROLOGICAL OFFICE TELEGRAMS AT SOUTH KENSINGTON BRANCH OFFICE, S.W.

	Weekly. £ *s.* *d.*	*Yearly.* £ *s.* *d.*
Sundays (7—8.30 a.m.). (8—8.30 p.m.).		
Male Counter Clerk and Telegraphist $4\frac{3}{4}$* hours at 1*s.* 5*d.* Mean Sunday	0 6 9	17 12 2
Tube Attendant $\frac{1}{2}$ hour at 3*d.* ... ... Extra Duty Rate.	0 0 $1\frac{1}{2}$	0 6 6
Weekdays (7—8 a.m.)		
Male Counter Clerk and Telegraphist $2\frac{3}{4}$† hours daily at 44*s.* a week (Mean of Scale).	0 15 $1\frac{1}{2}$	39 9 0
Extra cost for extra duty during Season: $4\frac{1}{2}$ hours weekly for 17 weeks at 3*d.* an hour		0 19 $1\frac{1}{2}$
Light (7 to 8 a.m.: 7 to 8.30 a.m. Sundays) say 15 weeks		0 2 0
Total		58 8 $9\frac{1}{2}$
Add 25% Head Quarters' Charges		14 12 $2\frac{1}{2}$
Total		£73 1 0

* 2 men ... ... 7 to 8.30 a.m. = 3 hrs.
1 man ... ... 7.30 to 8.15 a.m. = $0\frac{3}{4}$
2 men ... ... 8.0 to 8.30 p.m. = 1
$4\frac{3}{4}$

† 2 men ... ... 7.0 to 8.0 a.m. = 2 hrs.
1 man ... ... 7.15 to 8.0 a.m. = $0\frac{1}{4}$
$2\frac{1}{4}$

London Postal Service, 31st March, 1911.

Submitted—Report (201) by the Superintendent of the Forecast Division on the storm-warning telegrams of February, 1911, from which it appeared that 57 per cent. of the telegrams were delivered within an hour of the time of despatch and 9 per cent. were not delivered till the next morning. Among these were included a number of warnings issued at 9 hrs. 41 mins. on Sunday, 19th February, on account of a report from Blacksod which was received at 9 hrs. 35 mins. Under revised regulations the Blacksod office is not open on Sundays until 8 hrs. 55 mins.

The Director read a draft letter to the Treasury prepared in view of the reported largely increased charge for special telegraphic services setting out the disabilities of the Meteorological Service as compared with other countries in consequence of its having no official status in relation to the telegraph service, and asking for a re-consideration of the position and for representation by a Post Office official.

It was agreed that a revised draft be considered at the next meeting.

M.O. Press.—Read—the following letter (M.O. 1271):

Wyman & Sons, Limited,
Great Western Printing Works,
Reading,
18th April, 1911.

DEAR SIR,

WE are in receipt of your letter of the 13th inst. *re* late delivery of the Monthly Meteorological Chart of the Indian Ocean for May, and much regret that you should complain, but, as the writer explained to Captain Hepworth on the 10th inst., it was impossible to keep to date with the existing arrangements owing to the fact of the Daily Weather Report occupying the steam press daily for several hours, and it being necessary to keep the supply of the blue printing constantly on hand. The writer mentioned that the only way to prevent a recurrence of the delay was to make an addition to the existing plant by laying down a further steam press, this would of course mean that we should require more room than we at present occupy. We may mention that this would be distinctly advantageous as it would enable us to have another mechanic at work and would also prevent a recurrence of the previous Saturday's fiasco when we were unable to print the report owing to the machine breaking down.

Yours faithfully,
for Wyman & Sons, Ltd.
F. C. UNDERWOOD,
Manager.

The Director,
Meteorological Office.

The Director was requested to report upon the subject in view of the possibility of taking in the lithographic work of the Weekly Weather Report and other circumstances.

299. *Supply of Information to the Press* (Minute 281).—Read—a draft letter to Health Resorts in accordance with the resolution of Minute 281 and Reports 202, 203, by Mr. Lempfert, upon interviews on the subject with representatives of the Press Association, Exchange Telegraph Company and Central News. No great demand for additional information on the part of newspapers is indicated, and it therefore appears that if the Health Resorts are to contribute their quota to the cost of inspection, compilation, and distribution to the press of the evening reports, it will not be practicable to make a distinction in favour of a station which supplies sunshine only as compared with one which includes other elements.

It was agreed to re-draft the letter accordingly for consideration at the next meeting.

300. *Branch Office at S. Farnborough* (Minute 291).—Read M.O. 1396, from Mr. O'Gorman, enclosing a sketch plan of proposed new buildings at South Farnborough to include an observatory for the branch Office. Also P.C. D236 to Mr. O'Gorman, pointing out the points in which the proposed provision deviates from the memorandum of Minute 291.

301. *Director's Report and Accounts:*—

Solar Physics Observatory.—The Director attended on April 13th to give evidence before a Committee consisting of Sir T. L. Heath (Chairman), the Astronomer-Royal, Dr. Glazebrook, and Dr. Schuster, with Mr. F. G. Ogilvie as Secretary, appointed to report upon the future provision for the work of the Solar Physics Observatory (Report D. 01).

Publications.—Geophysical Journal.—Submitted—final proof of the January number and preface to the *Geophysical Journal*, replacing four pages monthly of the *Observations at Stations of the Second Order*.

Daily Weather Service.—On 1st May, by international arrangement, the barometric tendency, represented by the change in the barometric height in the three hours previous to the reading of the barometer was substituted for the reading of the wet-bulb in the international telegrams, and the Daily Weather Report was revised in order to provide for the change in the information to be recorded. No difficulty has been experienced at any of the British or Irish stations which have barographs except at Wick, and in consequence it has been arranged to transfer that station from Miss Sinclair's house, Coach Road, Wick, to the Coastguard, which affords a much better site for the instruments.

The Rev. W. Brand, of Dunrossness, has given notice to discontinue the observations at the station which has been at the Manse, Dunrossness, since 1875. Arrangements are in progress for transferring the work to the coastguard at Lerwick, so that the necessity for the early opening of Dunrossness telegraph office will cease.

These changes are to be carried out by Mr. Lempfert, on an inspection journey commencing on 6th May.

Wind Measurements at Barrow (A.C. 04).—The Admiralty have requested the assistance of the Office in arranging for suitable wind-recording instruments in connexion with the trial of the Naval Airship at Barrow-in-Furness, and an offer (P.C. D. 148 and D. 201) to lend Mr. J. S. Dines's services in constructing and erecting suitable apparatus has been accepted (Admiralty letter M. 4655).

Exhibitions.—In compliance with a request of Sir Alexander Pedler and the Science Committee, an exhibit has been arranged on behalf of the Office and the Observatories for the Coronation Exhibition, 1911. Special diagrams have been prepared representing rainfall and temperature in the past 30 years as represented in the Quarterly Summaries of the *Weekly Weather Report*, as well as twelve developable globes representing quarterly averages of the distribution of the meteorological elements over the ocean ; also a reproduction of the Eskdalemuir record of the Seistan earthquake, and photographs of the observatory.

At the request of the Chairman of the first International Aeronautical Exhibition, an exhibit was prepared with the co-operation of Mr. Dines and Mr. Cave to represent the methods and results of upper-air investigation in this country. The exhibits were sent to St. Petersburg, where the exhibition was opened on 23rd April (M.O. 1165).

Reports of Work.—1. *Marine Division.*—Data for islands in the South Indian Ocean in preparation for Admiralty. 25 meteorological logs, 1 lighthouse register, 132 North Atlantic registers, 56 radio-telegraphy registers, and 30 Indian Ocean registers, examined. Issue of the North Atlantic Meteorological Chart for April, 1911, completed. May issue begun on 13th April. Indian Ocean Meterological Chart published for May ; June and July in the press. Extension of May and subsequent charts to 125° E. (vii.) Preparing reductions of Daily Weather Charts of the Antarctic Seas. The Charts for October to December, 1901, January to October, 1902, and the whole of 1903, are now passing through the press, and the reductions of November and December, 1902, are ready for lithographer. In the press 25 months, ready for press 2 months, still to do 3 months. Preparing mean monthly charts for the period October, 1901, to March, 1904, inclusive, and 12 charts showing monthly averages. Preparing 12 small globes to illustrate meteorological averages for the Coronation Exhibition.

The estimation of cost (at rates ordinarily charged) of work done for Public Offices £2 2*s.* 6*d.*

2. *Forecast Division.*—(1) Current work on the Daily, Weekly, and Monthly Weather Reports and on the Atlantic Charts has been kept up to date. Arrangement has been made for reporting " barometric tendency " from May 1st.

(2) Number of wireless messages received :—

H.M. Ships	9
Mercantile Marine	388

Those received from H.M. Ships have been reported each week to the Admiralty.

(3) Corrections to Daily Weather Report for March, now with lithographer.

(4) Forecast Checking. The work is completed up to February 23rd and March 17th.

(5) Tabulation of gradient wind velocities for four stations, completed up to December 6th.

(6) Wind frequency tables prepared to end of March, checked to end of November.

(7) Working charts prepared for binding up to end of 1910.

(8) Storm Warning checking. Results for 1910 summarised for Annual Report.

(9) The number of inquiries answered has been as follows :—

Prepaid Replies	11
Telegraphic Inquiries (application by letter or personal) ...	2
Inquiries by telephone	2
Personal (answered immediately)	1

(11) Admiralty Forecasts.—Daily Forecasts have been sent to—
Admiral, Home Fleet, twice daily since January 17th.
Naval Aeronautical Department, Barrow.
Officers in Command, Devonport, Portland and the Nore.
H.M. Ships within range of wireless telegraphy.

Expenditure incurred by M.O. on behalf of the Admiralty in sending telegrams amounted to £1 4*s.* 8*d.*

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, Parts I., II., and Part III., Section i., up to date. Part III., Section ii., January issue nearly complete. Usual work for library. Inquiries (April, 1911) as follows : Newspapers, 15 ; Legal, 7 ; Scientific and Commercial, 31 ; Forecasts, 7 ; General, 5. The receipts in connection with these amounted to £4 2*s.* 2*d.*

4. *Instruments Branch—Observatories.*—Preparation of Part IV. of Year Book, 1911, for the printer : the copy for the month of January has been forwarded to the Stationery Office, and the copy for the February and March issues has been completed.

Chopwellwood (Durham) has been added to the list of stations forwarding sunshine cards for examination and return.

The boxes of sunshine cards for the 31 years 1880–1910 are now being stacked on the shelves prepared for them in the basement.

The examination of the observatory returns, checking the measurements of the sunshine cards, and tabulation of the rainfall and wind records, have been kept up to date.

The curves and tabulations received from the observatories have been satisfactory.

Instruments.—The usual Admiralty and Office work.

The head and vane of the Holyhead pressure plate anemometer has been repaired by the office staff and returned for re-erection. A grass minimum and earth thermometers for 1 ft. and 4ft. depths have been sent for use at Birr Castle Station.

Instruments have been supplied against repayment to four persons.

Requisitions have been received from the Commonwealth of Australia and the Union of South Africa.

Two Colonial requisitions are still in hand, and part of a third.

5. *Investigation of the Upper Air*—(Mr. Dines's Report—Quarter ended 31st March, 1911).—The usual work of the station was carried on as usual during the quarter, excepting that I was away for a fortnight in March. Five registering balloons were sent up of which four were found. Owing to the strong W. and N.W. winds that prevailed during the three international days in the first week in March no balloons were despatched, as past experience has shown that the prospect of getting back the instruments is very slight indeed in such weather.

I am glad to be able to report that no accident has occurred with the kites, although, on the whole, when kite flying was possible at all, the weather has been very bad.

Observatories—Kew.—The usual routine work has been carried out, and tabulated data from the meteorological curves have been sent weekly to the Office.

Observations of the three magnetic elements have been made weekly, and observations of potential gradient on about half the days. A considerable number of observations of loss of charge have also been made with the Wilson apparatus, but the results do not appear altogether as consistent as might be desired.

Observations have been made with the Ångström pyrheliometer near noon whenever weather conditions allowed.

The work of a telegraphic reporting station has gone on uninterruptedly, and data for the new *Geophysical Journal* have been got out for March.

The experimental observations on "Marine" barometers and the extraction of fog data for the investigation designed by Mr. Gold have proceeded systematically.

The tables for the Annual Report for 1910 have been completed, and are now in the printers' hands.

An Ebert apparatus has been received from the makers, Messrs. Gunther and Tegetmeyer, and it is hoped to bring it into use in May.

A course of instruction in the taking of absolute observations has been given (commencing in March) to Lieutenant Melhuish, R.I.M.

Eskdalemuir.—Meteorological.—The normal work has continued without interruption, and the instruments have been in good order.

Magnetic.—The tabulation of the results for the V.F. records showed that, after allowing for the discontinuity produced at the time of changing the lights, the values appeared to increase continuously during a month. The obvious explanation is that the strain produced in the pier at the time of changing was gradually relieved in the following 24 hours. After consultation with the Director it was decided to cut the pier quite free from all connection with the clock pier. This was done on 17th April, and no discontinuity has occurred since.

The new bifilar quartz magnetograph with large damping continues to give satisfactory results.

Electrical.—A new form of water dropper was tried with the Zn.-Cu. voltmeter. The results were quite satisfactory. The Zn.-Cu. voltmeter has accordingly been installed in parallel with the Dolezalek electrometer, and the adjustment to symmetry is being made.

Messrs. Gunther and Tegetmeyer have as yet failed to return the Ebert apparatus sent for repair in February.

Seismology.—The Galitzin seismographs have been in good order, and tabulation of results for the *Geophysical Journal* are being made.

The source of the jerk in the Milne recording cylinder has at last been traced by the mechanic to a defective pinion in the clock. The defect has been removed.

Accounts.—Submitted—The following statement:

	£	*s.*	*d.*
Cash balance on 31st March, 1911	1,270	0	4
Receipts from 1st to 30th April, 1911	4,860	8	1
	6,130	8	5
Cheques drawn from 1st to 30th April, 1911	1,393	16	10
Cash balance on 30th April, 1911	4,736	11	7

THIRTY-SEVENTH MEETING.

South Kensington, London, S.W., 5th July, 1911.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW. | CAPTAIN HARVEY.
SIR G. H. DARWIN. | MR. MIDDLETON.
DR. SCHUSTER.

302. The Minutes (296–301) of the last meeting (3rd May, 1911) with alterations of the figures of Minute 295 of 5th April were read and confirmed.

303. *Accounts for* 1910–11.—Submitted—the following comparison of Expenditure for 1910–11 (Minute 295) with the Estimates (Minutes 216, 217, 240) :—

COMPARISON OF EXPENDITURE WITH ESTIMATES, 1910–11.

Items.	Heads of Service.	Estimates Nov., 1909 and March 1910 (Minutes 216, 217, 240.)	Expenditure, 1910–11.	Excess.	Defect.
		£	£ s. d.	£ s. d.	£ s. d.
1	Director	1,000	1,000 0 0	—	—
2	Office salaries	7,933	8,039 11 6	106 11 6	—
3	M.O. Observatories (three quarters only)	2,306	2,249 17 0	—	56 3 0
	Office expenses :				
4	Rent, fuel and lighting	725	697 2 8	—	27 17 4
5	Furniture, fittings, &c. and incidental	410	482 10 2	72 10 2	—
5*a*	Furniture, fittings and instruments for New Office.	—	537 0 2	537 0 2	—
	Dilapidations and incidental expenses	—	138 6 0	138 6 0	—
	Postage and Telegrams :				
6	Postage	500	635 9 4	135 9 4	—
7	Telegrams from inland stations and H.M. ships.	550	497 14 7	—	52 5 5
8	„ from Mercantile Marine ...	350	340 10 0	—	9 10 0
9	„ from abroad	350	385 18 3	35 18 3	—
10	„ sent abroad	530	465 6 9	—	64 13 3
11	„ storm warnings	300	289 15 8	—	10 4 4
12	„ harvest weather forecasts...	65	83 12 9	18 12 9	—
13	„ sundry telegrams	90	139 7 2	49 7 2	—
14	„ private wires, &c.	50	1 1 0	—	48 19 0
15	Allowances to clerks	220	134 15 2	—	85 4 10
16	Travelling expenses	340	327 14 5	—	12 5 7
	Superannuation :				
17	Operative	1,058	1,032 0 0	—	26 0 0
18	Fund	718	718 0 0	—	—
19	Cost of instruments for Office use and Stations, Colonial Governments, &c.	1,100	1,706 16 4	606 16 4	—
20	Cost of instruments—Royal Navy ...	500	506 4 6	6 4 6	—
21	Allowances for observatories, &c. ...	2,637	2,603 0 8	—	33 19 4
22	Lectures and experiments	350	458 3 1	108 3 1	—
22*a*	Antarctic Meteorology	—	10 5 2	10 5 2	—
	Total Expenditure	22,082	23,480 2 4	1,887 13 6	489 11 2
			Receipts.		
	Appropriations in aid :				
23	Observatory expenses refunded ...	1,369	1,305 6 4	—	63 13 8
24	Departmental expenses refunded ...	445	447 2 0	2 2 0	—
25	Incidental expenses refunded ...	490	550 1 0	60 1 0	—
26	Telegraphic expenses refunded ...	620	508 7 7	—	111 12 5
27	Cost of instruments refunded (Royal Navy).	500	506 4 6	6 4 6	—
28	Cost of instruments refunded (other sources).	800	1,489 10 5	689 10 5	—
29	Superannuation (including £59 paid from Superannuation Fund on account of Mr. Call).	708	690 5 7	—	17 14 5
30	Lectures and Experiments	400	325 5 8	—	74 14 4
31	Amount refunded	—	0 0 10	0 0 10	—
	Total of Appropriations in Aid ...	5,332	5,822 3 11	709 16 3	219 12 4
	Net expenditure	16,750	17,657 18 5	907 18 5	—

NOTES.

Item 2.—During 1910–11 £77 (on balance) was paid out on account of salaries reserved in other years. £12 additional paid on account of Telephone Clerk and Laboratory Attendant was sanctioned by Minute 282.

Item 3.—This item includes the net expenditure of £50 18*s.* 5*d.* in excess of grant at the rate of £1,000 per annum received from the Treasury through the Royal Society.

Item 5.—£44 for Indian Meteorological Tables; new cyclostyle £15 10*s.*

Item 5*a*.—Chargeable against balance, not included in estimates. £18 to New System Tel. Co. (Minute 280).

Item 6.—Under-estimated by £135, from expenditure for 1908–9; the expenditure in 1909–10 showed an increase over 1908–9 of £88. The number of subscribers to Daily Weather Report 58 (£37 postage) in excess of estimate. Charges for re-direction of parcels were not estimated but other items are not new; the remainder is general increase of postal charges.

Item 7.—Only 11 months' charges were paid during the year.

Item 9.—£30 of the excess is due to the service of telegrams from Madeira, payment for which was begun during the year; the remainder is recoverable.

Items 10 and 11.—Eleven months' account only.

Item 12.—Recoverable.

Item 13.—Eleven months' account only. The excess includes £48 recoverable and since paid.

Item 14.—Private wire (payable in advance) from the Office was discontinued. Payment for Valencia private wire not made in the year.

Item 15.—One quarter's allowance £51 not charged.

Item 17.—£59 payable under this head has been taken from the Superannuation Fund, item No. 18.

Item 18.—£59 paid to Mr. Call (see item No. 17) and £659 invested in 2½ per cent. Annuities.

Item 19*a*.—Excess is recoverable, see Appropriations in Aid, No 28.

Item 20.—Amount recoverable.

Item 22.—Schuster Reader half-year only. Experiments at Pyrton Hill and in Galway met by appropriations in aid from Advisory Committee for Aeronautics and from British Association.

Item 22*a*.—Payable from balance of previous accounts.

Item 23.—Two quarters only of the Gassiot Fund were received during the nine months. Some miscellaneous receipts from sale of photographic paper were not included in the estimate.

Item 25.—Ordinary increase.

Item 26.—Only 11 months' accounts issued and paid.

Item 28.—See item 19. M.O. stock of instruments has been decreased by £42.

Item 29.—£59 transferred to meet Mr. Call's pension. £26 deducted for income Tax on four annuities of £150 each.

Item 30.—£350 Readership Fund not received. £250 received from Advisory Committee for Aeronautics for experiments at Pyrton Hill not estimated for, also £25 from British Association.

The expenses which may be regarded as capital expenses or otherwise chargeable against balance are as follows:—

	£	*s.*	*d.*
Dilapidations, furniture, &c., for New Office (Item 5*a*, with £10 9*s.* 8*d.*, incidental expenses)	685	15	10
Other exceptional charges (Item 5)	59	5	3
Salaries reserved (Item 2)	76	11	6
	£821	12	7

leaving £86 6*s.* 4*d.* as the excess of ordinary expenditure above the estimates or grant for the year, which is accounted for by the increase in the item of postage, but the proposed charge for the use of South Kensington Post Office at the rate of £73 1*s.* per annum in lieu of the private wire to Victoria Street has not yet been met.

The expenditure in excess of the Estimate was allowed. It was agreed to carry forward the deficit on the Eskdalemuir Account.

304. *Sixth Annual Report.*—(Minute 297). The draft Report for the year ended 31st March, 1911, was submitted, approved and signed on the understanding that the illustrations, including reproductions of photographs about which correspondence had taken place with the Stationery Office, would be inserted before the Report was printed off.

305. *New Office* (Minute 298) (*a*) *Post Office charges.*—The Director submitted a revised draft of a letter to the Treasury with reference to the Post Office facilities and charges in accordance with Minute 298.

After discussion it was agreed to modify the form of the letter, and to put explanatory details of the application, especially that part of it which refers to the negotiation of international arrangements, in a separate memorandum (Report D03).

Submitted—the following memorandum by the Superintendent of Forecasts, on the telegraphic distribution of meteorological information in Germany:—

TELEGRAPHIC DISTRIBUTION OF METEOROLOGICAL INFORMATION IN GERMANY.

We have received from the Deutsche Seewarte (M.O. 1801) details of the arrangements for transmitting from the Seewarte to various German sub-centres for the issue of forecasts the material for constructing Daily Weather Charts.

The Seewarte issues each day three collective telegrams for which anybody—Government Institution, Newspaper, or private individual—can subscribe. Applications for the telegrams must be addressed to a postal telegraph office, not to the Seewarte. The post offices also supply the recipients with forms for decoding the messages and all necessary instructions for interpreting them.

The subscriptions are as follows :—

For the 1st morning telegram 20 marks per month.
„ 2nd „ „ 10 „
„ afternoon „ 10 „

or less than 1*s.* 4*d.* per day for the complete set of telegrams.

The first morning telegram is despatched at 9.15 a.m. (8.15 G.M.T.). It contains data for 58 stations, compressed into 56 × 3 = 168 groups of figures. All the observations reported are taken at 8 a.m. German time, 7 a.m. G.M.T.

The second morning telegram is despatched at 9.45 a.m. (8.45 G.M.T.). It contains similar data for 21 additional stations, compressed into 60 groups of figures. In addition, reports which arrive at Hamburg too late for inclusion in the first telegram are appended to the second.

The afternoon telegram is despatched at 4 p.m. (3 p.m. G.M.T.). It contains observations mainly at 1 p.m. G.M.T., for 30 stations, compressed into 60 groups of figures.

The stations are apportioned among the three telegrams as follows :—

——	1st Morning.	2nd Morning.	Afternoon.
Germany	18	—	13
Great Britain	8	1	3
France	4	5	1
Holland	2	—	2
Norway	4	—	3
Denmark	3	—	1
Sweden	5	—	4
Russia	7	1	1
Austria	2	5	1
Italy	3	1	—
Iceland and Faroe	2	1	—
Finland	—	2	1
Servia	—	1	—
Switzerland	—	4	—

The British stations included in the first telegram are Stornoway, Malin, Valencia, Scilly, Aberdeen, Shields, Holyhead, Skegness. These reports are sent direct to Hamburg from the observing stations.

The British station included regularly in the second morning telegram is Lerwick. No information is sent from Lerwick to Hamburg, but a daily message is sent from Lerwick to Utrecht, and presumably sent on from there to Hamburg.

The morning telegrams report the morning observations and also the barometer reading of the previous evening. Subscribers to all these telegrams thus receive each day material for the construction of three pressure maps.

The code is an adaptation of the international code. Maximum and minimum temperature is omitted.

In reply to a further inquiry, Admiral Herz has informed us that the number of subscribers for the first morning telegram amounted to 51 in the month of August, 1910, while 35 persons subscribed for the second morning telegram.

In addition to the above telegrams there is issued from the Seewarte every morning at 8.45 a.m. G.M.T. a telegram of from 30 to 35 words giving a brief description of the pressure distribution over Europe and of the weather experienced during the past twenty-four hours over Germany. The subscription for this additional telegram is 10 marks per month.

(*b*) *Meteorological Office Press.*—(Minute 298).—Read—the following Report :—

THE Director reported that he had discussed the question of an additional machine press with Messrs. Wyman's representative, Mr. Underwood, and it appeared that it was wished to have a second machine similar in every respect to the present one so that in case of failure of any part of one machine an exact duplicate would be available. The existing plant is fully occupied and a number of orders for forms &c. are in arrear. Without an additional press it would hardly be practicable to take over the lithographic work of the Weekly Report. The printing of the Daily Weather Report has failed on three occasions since January 1911. The printing of the Monthly Charts in their new form at one time was in arrear but the arrears are now overtaken and, except for the risk of break-down, the printing is very satisfactory. There is no room in the space allotted to the printers for an additional press. To make room the workshop would have to be moved elsewhere and the partition moved.

The only space in the Office not regularly occupied is the Western section of the Library, the Northern bay of which is used for the display of new books and the Southern bay by visiting readers. The two combined form the Office Lecture Room. It might be possible to move the "observatory" staff of four clerks into the Library and make a workshop in room 15 which would be more convenient for the purpose than the basement, as the workshop would thus be immediately under the laboratory, but the regular occupation of all the space in the Library would be a serious disadvantage.

Further consideration of the question was postponed.

(*c*) *Night Watching of Office Premises.*—Read—M.O. 1839 from the Office of Works covering a report from the Board's Clerk of Works at South Kensington in reference to

the safeguarding of the premises at night, calling attention to the locking of the door after the cleaners had been admitted, and suggesting the desirability of providing a night watchman and sharing the cost between the three departments occupying the building.

The Director reported that in the absence of a resident caretaker difficulty was experienced in making provision for the custody of the keys and the admission of the cleaners at 6 a.m. and then the staff at 7 to 7.30, especially as when the office was first occupied there was no outside bell. Arrangement was ultimately made for the Police at the Victoria and Albert Museum to keep the keys and let in the cleaners at 6. The keys were handed to the office-keeper on his arrival at 7.15 and returned to the police at night.

Recently, in consequence of the reorganisation of the system of watching the Victoria and Albert Museum and the consequent reduction of the police force there, the police are no longer able to keep the keys at the West Entrance to the Museum passage. It is therefore proposed to employ a constable on overtime duty to attend at the office door with the keys from 6 a.m. to 7.30 a.m. daily on payment at the rate of 2*s.* per day, the keys being handed to the police officer at the Brompton Road entrance when the office is closed at night.

A draft letter to the Treasury demurring for reasons given to the employment of a night watchman and asking for instructions was submitted. It was agreed in the first instance to reply to the Office of Works (P.C.D. 372).

(*d*) *Office Flagstaff.*—Read—the following letter :—

(M.O. 1583.)

H.M. Office of Works, &c., Storey's Gate, Westminster, S.W.

SIR, 16th May, 1911.

THE Board having been informed that the flag is flown at the Meteorological Office upon dates other than those which have been officially approved, I am directed by the First Commissioner of His Majesty's Works, &c., to transmit for your information and guidance the official list of dates upon which alone flags are to be hoisted on Public Buildings.

I am, &c.,
W. J. DOWNER.

The Director,
The Meteorological Office.

DAYS FOR HOISTING FLAG ON GOVERNMENT BUILDINGS.

From 8.0 a.m. till Sunset.

20th February	Birthday of the Princess Royal.
18th March	Birthday of Princess Louise, Duchess of Argyll.
31st March	Birthday of Prince Henry.
14th April	Birthday of Princess Henry of Battenberg.
25th April	Birthday of Princess Mary.
1st May	Birthday of the Duke of Connaught.
6th May	Anniversary of His Majesty's Accession.
25th May	Birthday of Princess Christian.
26th May	Her Majesty's Birthday.
3rd June*	His Majesty's Birthday.
23rd June	Birthday of the Duke of Cornwall.
6th July	Anniversary of Their Majesties' Wedding.
6th July	Birthday of Princess Victoria.
12th July...	Birthday of Prince John.
26th November	Birthday of the Queen of Norway.
1st December	Birthday of Queen Alexandra.
14th December	Birthday of Prince Albert.
20th December	Birthday of Prince George.

Opening (and Closing) of the Sessions of Houses of Parliament by His Majesty.

The Royal Standard is only to be hoisted when the King or the Queen is actually present in the Building, and never when Their Majesties are passing it in Procession.

H.M. Office of Works, &c.,
24th May, 1910.

(*e*) *Relief Map of the British Isles.*—Reported—that the relief map ordered in accordance with Minute 262 was expected to be delivered on 10th July and that it would be necessary to provide a suitable glass case for its protection.

Authority was given for ordering a case from Messrs. Sage & Co., Ltd.

* Also on any day appointed for the Official Celebration of His Majesty's Birthday, should such celebration not take place on 3rd June.

306. *Australasian Antarctic Expedition*—(M.O. 1593, 2098, The Geographical Journal, June, 1911).—Dr. Mawson proposes to take out an expedition to the Antarctic under the auspices of the Australasian Association for the Advancement of Science, to land at a point north of the Magnetic pole, to establish three stations along the coast in that region and carry on magnetic and meteorological observations in accordance with the following scheme :—

AUSTRALASIAN ANTARCTIC EXPEDITION, 1911.

This is under the partial control of a special committee elected by the combined scientific societies of Australia and New Zealand. Professor David of Sydney University and Professor Orme Masson of Melbourne University are joint chairmen. I am in supreme command.

The total cost is estimated at £40,000.

This includes ship, fuel, dues, equipment, scientific apparatus and nominal salaries for 25 men on the ship, and 25 men on the shore party for a two years' campaign.

This sum would be inadequate for the large programme resolved upon, were it not that much of the expense of apparatus, and large quantities of the stores are being presented gratis by individuals and British firms.

I was magnetician and geologist on Sir Ernest Shackleton's expedition, and had the honour of first determining the position of the South Magnetic Pole by observations on the spot, after a sledge journey in company with Professor David and Dr. Mackay, which holds the record in the Antarctic, as an unsupported effort, in distance and duration.

The services of Captain J. K. Davis, Commander of the "Nimrod" during the latter part of the Shackleton expedition, have been secured for master of the ship. Davis is a most experienced sailor and navigated the "Nimrod" on her homeward journey in a higher southern latitute during the winter, than had ever previously been accomplished by any vessel.

The area to be explored is that part of the Antarctic Continent lying due south of Australia. In that region the coast line extends in an east and west direction for about 2,000 miles in the latitude of the Antarctic circle. This is regarded as by far the most important portion of the Antarctic Continent (which is as large as the combined areas of Europe and Australia) yet to be explored. It is known to be a mountainous and rocky coast line, but, between the limits of Cape Adare and Gauss Berg (shown on the map), the Continent has been landed upon once only, and then but for a few hours, by D'Urville's expedition in 1840. Only very few vessels have ever come within sight of this coast, and none since about 1854.

We desire to receive authority to raise the Union Jack and take possession of this land for the British Empire. 25 men, fully equipped for a scientific campaign on this coast will be landed in three parties, each separated by several hundreds of miles. Sledging parties will survey the 2,000 miles of coast and the adjacent mountains. This we feel confident of achieving, and will constitute a record of its kind for a single expedition. This work will be aided by dog teams and motor sledges.

A journey will be made inland to the Magnetic Pole, approaching it from the opposite direction to that which I adopted on the last expedition. This will complete the South Magnetic Pole problem from a scientific point of view, and remain a permanent achievement to the British nation.

The Magnetic charting of this area will be of economic value to navigation.

Active volcanoes are known to lie off this coast, and will be investigated. The want of geological data from this area is keenly felt, and economic discoveries may result. Coal is known to exist on the Antarctic Continent, and the rocks, where known to the east, are metalliferous.

Islands which may be discovered in the adjacent seas are likely to be stocked with penguin guano.

Biological researches will be rich in new discoveries. It may be, that there is the habitat of some of the rare types of seals and Antarctic birds.

Certainly the southern ocean in that vicinity abounds in whales and seal life, and if we can establish convenient harbours there is sure to follow commercial enterprise on these lines.

The meteorology is very important in connection with shipping along the southern coast of Australia and New Zealand. It is thought that the erection of a wireless weather station there will be of very great service in connection with Australasian weather reports.

After putting ashore the land parties, the ship will continue to explore the Continent towards Africa, until the advent of autumn drives her northward into a more congenial climate. The winter will be spent in oceanographic work on the lines of that adopted by the Prince of Monaco. Deep sea trawlings from between 500 and 2,000 fathoms will be made at intervals in this as yet unexplored southern ocean, and almost every species brought up must be new to science.

In scientific circles an expedition to the region is looked upon as a pressing need. At the present time almost all scientific information concerning the Antarctic proceeds from two local areas, namely those visited by Captain Scott and Sir Ernest Shackleton, and the Graham's Land region. The Australian Commonwealth has set aside a sum of £15,000 for the entertainment of the British Association for the Advancement of Science which have been invited to meet in Australia in 1914. We anticipate having accomplished this expedition by that time, and having the honour of presenting such valuable scientific information as may result on this auspicious occasion.

The possible economic future of this great territory demands immediate investigation in view of the fact that other nations are becoming aroused to its importance. In past times the British Empire has lost valuable assets through lack of knowledge of its distant territory, as instances may be mentioned the cases of Alaska and New Guinea. In Alaska the output of gold alone, during the last 15 years, has exceeded the British national debt.

The coast line between Cape Adare and Gauss Berg, stretching as it does so far towards Australia is likely to be easily accessible to shipping, and in the near future is sure to be the scene of summer pleasure cruises from Australia and New Zealand.

At any rate, being but a few days' steaming from Australia it is too conveniently situated to be left as a possible colonial possession of a foreign nation, especially as coal is known to occur on the

Continent. The off-lying sub-antarctic ocean is, as yet, almost unknown, and islands may be met with in those easily navigable waters.

Several Australians have contributed £1,000 each, and the Committee in Australia have cabled that the private donation list approximates £10,000.

The Prime Minister and leading members of the Commonwealth Government have intimated their intention of sympathetically considering a grant of £20,000 asked for, as soon as the House of Representatives meets in September.

The confidence of scientific bodies is expressed in the fact that the Australasian Association for the Advancement of Science has donated £1,000 and the Royal Geographical Society £500, a similar amount with that granted to Captain Scott.

A vessel has been acquired which is to sail on 20th July, 1911. Dr. Mawson with whom is associated Dr. Farr, Professor of Physics in Canterbury University, New Zealand, asks for the loan of—

(1) Ships' instruments on the usual terms.
(2) The Antarctic sunshine recorder now in the Museum.
(3) Three standard barometers presumably of station pattern.

They also ask for the good offices of the Director in securing international co-operation with regard to the magnetic work.

It was agreed to lend the ships' instruments on the usual terms and the Antarctic sunshine recorder, but as regards additional instruments to reply that the Office had no funds available for the gratuitous supply of instruments and could only supply them against repayment.

The following circular of invitation to the authorities of foreign observatories to co-operate in the undertaking was reported :—

Meteorological Office, South Kensington, London, S.W.

AUSTRALASIAN ANTARCTIC EXPEDITION.

DEAR SIR,

IT has been arranged that a scientific expedition to be called the Australasian Antarctic Expedition, should proceed to the Antarctic continent from Australia about the close of this year, with a complement of about 50 men, all told. The special desire of the expedition is to accomplish a geographic and magnetic survey as complete as possible along the coast of the Antarctic continent between Cape Adare and Gaussberg, a distance of over 2,000 miles. An oceanographic survey of the Southern Ocean, south of Australia, assisted by the Prince of Monaco, and meteorological observations will also be undertaken. There is to be no attempt to reach the South Pole. The expedition is supported chiefly by Australia and New Zealand, but help and advice have also been obtained in England and America.

The leader of the expedition is Dr. Douglas Mawson, who accompanied Sir Ernest Shackleton on his recent journey to the Antarctic, and was one of the leading members of Shackleton's party. Professor C. C. Farr of Canterbury College, New Zealand, is arranging the programme of magnetic work.

Dr. Mawson is anxious to perfect his arrangements for obtaining accurate records of terrestrial magnetism in the Antarctic. He is to take a complete set of Eschenhagen magnetographs, and he wishes to arrange for "quick runs" of the recording apparatus to take place simultaneously at his base and at the principal magnetic observatories of the world. It is hoped to secure the co-operation of the German Antarctic Expedition, which has already started for the far South.

I have been asked to invite international co-operation in regard to the magnetic work at the times indicated hereunder by Dr. Chree of Kew Observatory.

I have the honour cordially to invite your assistance in this enterprise, and should be glad if you could arrange for the quick runs to be made at the observatory or observatories under your charge.

As the primary purpose of a "quick run" is to facilitate the determination of the exact times of events connected with magnetic disturbances, it is specially requested that accurate time marks should be made on the records obtained during the term hours.

I am, dear Sir,
Yours faithfully,
W. N. SHAW.

MEMORANDUM BY DR. CHREE.

The magnetograph records obtained in 1902–3 by the stations of Prof Birkeland's Norwegian Arctic Expedition, and by the British National Antarctic Expedition under Captain Scott, showed that many at least of the comparatively small disturbances, which are of common occurrence in temperate latitudes, are associated with much larger disturbances in high latitudes.

The large size of the Arctic and Antarctic movements facilitates the recognition of definite stages in the disturbance, and a comparative study of them and of the corresponding smaller movements occurring elsewhere is likely to suggest points of significance in the disturbances in temperate latitudes which would be unlikely otherwise to attract attention.

One of the chief difficulties in the intercomparison of ordinary magnetic curves arises from uncertainties as to the exact times at which particular movements occur. This difficulty can be largely reduced by increasing the rate of travel of the photographic paper.

These considerations point to the desirability of a series of quick runs of magnetographs during the stay in the Antarctic of the Australasian Expedition shortly to start under Dr. Mawson.

The following scheme of term hours has accordingly been prepared at the request of Dr. Mawson.

Forenoon, from 8h. to 10h. Greenwich mean civil time.

1912.	1912.
19th March	16th July
16th April	13th August
14th May	10th September
11th June	8th October

Afternoon, from 17h. to 19h. Greenwich mean civil time.

1912.	1912.
21st March	18th July
18th April	15th August
16th May	12th September
13th June	10th October

Attention is particularly called to the fact that the hours are Greenwich civil time. The dates—all Tuesdays or Thursdays at Greenwich—are sufficiently near to new moon to facilitate the observation of aurora in the Antarctic. The hours have been selected from a consideration of the phenomena observed during the Antarctic Expedition of 1902-3. The hours 8 to 10 a.m., G.M.T. were those of most frequent occurrence of a special type of disturbance which seems closely similar to, if not identical with, the Arctic disturbances called "elementary polar storms" by Prof. Birkeland; while the hours 5 to 7 p.m., G.M.T. were those when rapid oscillatory movements were most in evidence at the "Discovery's" winter quarters.

307. *Supply of Information to the Press* (Minute 299).—In view of the proposed alterations of the relations with the Royal Meteorological Society as set out in Minute 308, the further consideration of the terms of acceptance of the telegraphic reports from Health Resorts was deferred.

308. *Co-operation with the Societies.—Royal Meteorological Society*:—Read—the following report by the Director:—

In 1905 negotiations were opened with the Royal Meteorological Society and the Scottish Meteorological Society with a view to providing a single comprehensive monthly publication for climatological data for all stations in the United Kingdom, and thereby avoiding the duplication arising from the collection and publication of meteorological data independently by the three organisations, towards which the Office was expected to make contributions through the Societies for the preparation of the data to the extent of about £100 to each Society with an additional grant for inspections.

The suggestion made in 1905 was that the three organisations should contribute their reduced observations to a common publication, the "Monthly Weather Report," and that the Office grant should be devoted to the discussion of the observations which is still very much in arrear.

The negotiations fell through at the time because the Scottish Society, partly on financial grounds, declined to entertain the proposal to contribute the data for its stations to a common stock.

Since that time there has been correspondence with the Royal Meteorological Society about the grant of £25 a year for inspections. The Office has laid down the requirement that the auditor should be assured that the money was spent on the inspection of stations which contributed observations for public use, and no satisfactory assurance has been given. Ultimately notice was given that the grant would not be continued beyond 1911 on the ground that the existing arrangements were not the best in the interest of meteorological science.

The Society has taken the matter up, and has decided to discontinue the publication of the "Meteorological Record" which is the equivalent as regards the Society of the "Monthly Weather Report," and now proposes to refer its observers to the Meteorological Office for the supervision and reduction of the observations and the publication of the data which they afford. It asks that in lieu of issuing the "Meteorological Record" the Society should be allowed to purchase at the cost price of printing off and stitching copies of the "Monthly Weather Report" for distribution to the fellows of the Society. It is also suggested that a joint committee representative of the Office and the Society with Mr. Marriott, Assistant Secretary of the Society, as Secretary should organise a scheme of discussion of the data to be undertaken by the Society and the Office jointly.

The Society asks that in these circumstances the Office should still continue to make a contribution to the funds of the Society to meet part of the cost of the staff which will still be employed there for the purpose of discussion.

The financial aspect of these propositions is as follows:—

The grant for inspections, £25, will be practically saved because the inspection was largely in duplicate.

If the observers send their observations to the Office instead of the Society the reduction of observations from 80 additional stations, including 19 at present reduced for the Office by the Society, will devolve upon the Office, and some additions must be made to the staff of the statistical branch, which can hardly cost less than £100 a year.

There is accordingly, in present circumstances, not more than £25 a year of available margin unless the scheme for asking for contributions from health resorts towards the cost of supervising and inspecting the stations can be made to yield a sufficient sum to provide the necessary contribution.

So far as the Society is concerned the cost of printing and issuing the "Record" is saved, and on the other hand it stands to lose a certain number of subscriptions which are paid in order to secure publication of the data from contributing stations.

I have appointed Mr. Lempfert and Mr. Gold to represent the Office on the Committee for the preparation of a scheme of discussion of the climatological data for the British Isles, and the Society

has appointed its President (Dr. H. N. Dickson) and its late President (Mr. H. Mellish). I should like authority from the Meteorological Committee to ask the Stationery Office to allow the Society to have the additional copies of the "Monthly Report" on the terms suggested, and I should like the Committee also to take into consideration the financial question with a view to making a suitable contribution if funds permit.

The Report was approved, and it was agreed, subject to the consideration of the Estimates in November, to make allowance of £50 a year for two years, if the present grants for weekly reports, second order stations, and inspections are withdrawn.

309. *Appointments.—Graduate Assistant.*—The Director reported that he had been in communication with Professor J. Stanley Gardiner in respect to the appointment of Mr. Gordon Dobson, B.A., 1st class, Part I. Natural Sciences Tripos and Diploma in Geography with special proficiency in Surveying, of Gonville and Caius College, as Graduate Assistant, and had written the following letter :—

DEAR PROFESSOR GARDINER, June 15th, 1911.

I HAVE now found time to put into writing the suggestions that we discussed at Cambridge. They depend, as you will recollect, upon the idea that in observational subjects like Meteorology and Terrestrial Magnetism the most productive arrangement from the scientific point of view is to be found in the combination of facilities for the prosecution of a definite research with a routine of observations in the subject of the research or some allied subject which takes the place of the teaching work of the ordinary scheme of research in a laboratory.

In connection with the Meteorological Office there is an opportunity for research in atmospheric electricity which may be covered by the general subject of "the comparison of the electrical conditions of the atmosphere at Kew and Eskdalemuir." This would certainly be productive of useful results in a year from next October and the incidental issue would give opportunity for a man of exceptional ability to distinguish himself. It would be necessary for anyone who undertook the work to carry out regular observations and tabulations of electrical potential, ionisation mobility and air earth current, and I should add to that observations in solar radiation and probably also occasionally in terrestrial magnetism or ordinary meteorology.

If the College can see its way to providing a sum of £50 by way of Studentship to be held while conducting researches in connexion with the Office I am prepared to ask the Meteorological Committee on their part to appoint the researcher as Student-assistant for work under the direction of the Office. The student would, in this case, be domiciled at Kew Observatory and work under Dr. Chree's superintendence, but he might be required, if necessary for his research, to spend some time in attendance at the Office in South Kensington or at Eskdalemuir or one of the other observatories of the Office, in which case there would be a superintendent in general charge; or perhaps otherwise "in the field" when the student would have to do the best he could by himself. Research would be regarded as the primary object and the governing consideration.

The ordinary hours of attendance at the Observatory are, I believe, 9.30 to 5, with a half holiday on Saturday and a month's holiday in the year, but in my experience the exigencies of research pay little attention to Office hours and if one wants to find out anything one has to take the opportunities that offer, so that the rules as to hours in this case would have to be sufficiently elastic to be comprehensive as well as reasonable.

The tenure of the combined Studentship and Assistantship should be for a year from October 1st next, possibly renewable for a further period if the work goes on well but it is usual in order to provide for the case of unforeseen incompatibilities to be able to terminate the arrangement by a month's notice.

The Meteorological Committee meets on Wednesday July 5th, and if you will let me know what the view of the Master and Fellows is in the matter I will act accordingly.

Yours very truly,
W. N. SHAW.

Professor J. Stanley Gardiner,
Zoological Laboratory, Cambridge.

The appointment was approved on the terms of the letter at a salary of £60 a year.

Submitted—The following memorandum for future consideration :—

METEOROLOGICAL OFFICE.—GRADUATE-ASSISTANTSHIPS.

In order to afford opportunity for post-graduate study and research in Meteorology, Climatology, Atmospheric Electricity, Terrestrial Magnetism and Seismology, the Meteorological Committee have established [six] graduate-assistantships, of £60 per annum each, in connection with the Meteorological Office.

A graduate-assistantship is tenable at the Central Office in South Kensington, the Branch Office, South Farnborough, or at one of the Meteorological Office Observatories—Kew, Eskdalemuir, Valencia—at the discretion of the Director according to the nature of the study or research.

Graduate-assistants are responsible to the Director for the subject selected and for the manner of carrying out the work. They will be associated for the time being, at his discretion, with the staff of the Observatory or division of the Office to which the subject of research is related, and will be subject to the rules and discipline of the Observatory or division with which they are associated. They will be expected to undertake the adjustment and manipulation of instruments, the tabulation of curves or observations, the computation of means, normals, or other results that may be necessary for the discussion of the subject undertaken. So far as time allows they will take part in the ordinary work of the Observatory or division with which they are associated.

The appointment is by the Meteorological Committee on the nomination of the Director. The tenure is for one year from 1st October. It may be continued for a further period not exceeding a year in order to provide for the completion of a piece of work which cannot be finished in one year. It may be terminated at any time by one month's notice.

Office Staff.—On the recommendation of the Director it was agreed to appoint :—

Mr. W. Allingham as principal clerk in the Marine Division,

Mr. R. Sergeant to a First-class Clerkship in the Forecast Division.

The Director was authorised to make provision for an additional member of the staff in the Marine Division, to complete the number in the Division, taking into account the Fourth-class clerkship required for Mr. Skelton's promotion as Clerk Assistant under Minute 190.

Substitutes at Eskdalemuir.—On the recommendation of the Director, the employment of G. A. Clarke, of Aberdeen Observatory, as substitute for A. Gendle during his absence in the month of August, at £16 12*s.* for the month, on the terms and with the allowances of a resident assistant, was approved, and authority was given for the employment of one of the Kew staff as substitute for W. Parkinson during his holidays in September, with an extra allowance not exceeding the 15*s.* a week payable by resident assistants for board and personal washing.

310. *Director's Report and Accounts :—*

Gassiot Committee.—The meeting of the Gassiot Committee for the consideration of the Director's report on the work of the Observatories in the year ended 31st March, 1911, was held at Kew Observatory on 31st May, 1911, the President of the Royal Society in the chair. The documents presented to the meeting included, (1) advanced proofs of the Sixth Annual Report of the Meteorological Committee, embodying the administrative reports of the Meteorological Office Observatories. (2) Tables of meteorological and geophysical results obtained at the Observatories in the year 1910, a separate publication in continuation of the Reports of the Observatory Department of the National Physical Laboratory, and of the Reports of the Kew Observatory Committee of the Royal Society, &c. (3) The accounts of the Observatories for the financial year. (4) A memorandum by the Director to accompany the Report and accounts. (5) Printed off copies of the new monthly issue of *Observations at Stations of the First and Second Orders* in British units. (6) Final proofs of *Meteorological Office Observatories—Geophysical Journal*, monthly issue in C.G.S. units throughout. (7) Final proofs of *Meteorological Office Observatories—Hourly Readings from Autographic Instruments, Meteorological Section*, monthly issue in British units. (8) Skeleton tables of *Meteorological Office Observatories—Hourly Readings from Autographic Instruments, Geophysical Section*, giving magnetic results on the same lines as the Meteorological Section, to be included in an annual issue. (9) A memorandum on the scheme of publication of meteorological and geophysical results by authority of the Meteorological Committee.

The documents were duly presented, and referred generally to the magnetic sub-committee with the understanding that the printing and issue of all except No. 8 would go forward. A suggestion that the Meteorological Section of *Hourly Readings* after the January issue which was in type should be in C.G.S. units was approved.

Besides the ordinary business, the meeting had under consideration the question of the provision for seismology at Eskdalemuir in view of the acceptance of the Omori Seismograph on loan in October last, and the increase of the regular work of the Observatory upon the commencement of the regular tabulation of magnetic data in January, 1911. The circumstances are fully set out in the memorandum No. 4 of the above-mentioned documents. It had been assumed that in authorising the acceptance of the instrument the Royal Society would be willing to defray the incidental costs of setting it up, and would provide a sum of £200 a year for the two years of the loan to provide a scientific assistant with a special view to seismological work. A letter addressed to the President of the Royal Society on 22nd February, asking that the Director might be authorised to proceed with the appointment, had not been answered, and it transpired that the officers of the Royal Society were unwilling to proceed on the ground that by taking over the Observatory the Meteorological Committee had accepted the residuary financial responsibility of it. In the course of correspondence a definite resolution of the Gassiot Committee was mentioned as necessary, and the meeting of 31st May was called with that object in view. After long discussion a definite resolution asking the Royal Society to find the sum mentioned was passed, but the residuary financial responsibility for the Observatory is clearly not acceptable to the officers of the Society. The matter will go before the President and Council on July 13th, but if the Royal Society complies with the request in this instance it will be necessary to consider the position at the termination of the grant. At present the Observatory depends upon a grant of £1,000 from the Treasury, which is primarily for magnetism ; if it is to be made also an important centre for seismology, as its equipment would suggest, supplementary provision will be required. In two years' time the Superintendent will have been in charge five years, and if he is to continue it will be desirable to come to some understanding about his prospects as regards increase of pay and pension. It is, therefore, desirable that the whole question of the programme and finances of the Observatory should be taken up in the consideration of the estimates for next year or the subsequent year.

Branch Office, Meteorological Work.—Report for June, presented to the Advisory Committee for Aeronautics :—

The time has been mostly taken up with the construction and erection of anemographs to record direction as well as velocity upon the same drum. Mr. Dines was at Barrow in charge of the erection of apparatus there for a week at the end of May. For the first week in June he was by permission engaged in conducting the ascents of sounding balloons at Mungret College, near Limerick, in order to instruct the college authorities in the management of upper air investigation.

Mr. Dines's report for the two months is as follows :—

Theodolites.—Five pilot balloon ascents have been recorded.

Two tethered balloons have been followed ; a blue print has been made of the trace of one of them.

Apparatus.—The anemograph was dismounted on May 19th and the velocity recorder sent to Barrow with the original model of the direction recorder. The combined record of velocity and direction was set up at Barrow on May 30th.

A new velocity recorder supplied by Munro was set up and started on June 16th in connexion with the head at 98 feet. A new direction recorder has been completed and fitted to the clock drum of the pressure tube. The combined record has been running since June 24th.

A fresh working drawing has been prepared of the combined velocity and direction head.

A letter of thanks has been received from the Secretary of the Admiralty for Mr. Dines's services.

Arrangements are being made with Mr. Munro to construct the combined velocity and direction recorder so that it may be supplied to Shoeburyness and Farnborough.

Schuster Readership.—An advertisement has been inserted in *Nature* of June 29th inviting applications for the Schuster Readership for appointment to date from October 1st, 1911. August 1st has been fixed as the latest time for receiving applications.

Supply of Reports or Forecasts to Ships at Sea.—The Director reported that he had been approached by Lloyds and by the Post Office (letters M.O. 1498, 1678, T.C. 01) with regard to the supply by wireless telegraphy to ships at sea of information regarding derelicts and weather conditions and also of forecasts. He had had an interview with Captain Loring, Inspector of Wireless Telegraphy at the General Post Office, at which details were discussed. The arrangement which it is proposed to adopt is set out is the following circular, which has been approved by the Admiralty, the Board of Trade, and the Office :—

NOTICE TO MARINERS.

WIRELESS TELEGRAPHY.

Transmission of Reports in regard to derelicts and weather conditions.

Special arrangements have been made by the Postmaster-General for transmission of radio-telegrams between ships fitted with wireless telegraph apparatus and British Coast Guard Stations in regard to the position of derelicts dangerous to navigation, and weather and meteorological reports.

1. *Derelicts.*

Whenever a derelict is observed lying in the track of ships, and dangerous to navigation, its position should be notified by means of wireless telegraphy to the nearest British Coast Station. Upon receipt of the information steps will immediately be taken to notify the Admiralty, Lloyds and the Meteorological Office, and to forward the particulars by wireless telegraphy to ships proceeding on the North Atlantic, South Atlantic and North Sea routes, as the case may be, for a period of four days after the receipt of the information.

No shore station or inland charge will be made for this service.

2. *Weather Reports.*

Reports in regard to the local weather conditions prevailing at the Post Office Wireless Coast Stations at :—

Caister	Bolt Head	Malin Head
North Foreland	Lizard	Rosslare
Niton	Seaforth	Crookhaven (Brow Head).
Or Lloyd's signal stations at :—		
Southend	Barry Island	Butt of Lewis
Dover	Smalls	Cape Wrath
Dungeness	Tuskar	Dunnet Head
Beachy Head	Roches Point	St. Abbs Head
Horse Sand Fort	Old Head of Kinsale	Tynemouth
Portland Bill	Fastnet	Flamboro Head
Prawle Point	Inishtrahull	Spurn Head
Scilly	Torr Head	Aldeburgh
Lundy Island	Kildonan	

can be obtained by sending a radio-telegram to the nearest Wireless Station in the following form :—

" Indicate weather at . . . . . Captain . . . . . ."

The shore station charge for the radio-telegram and its reply will be 5*s*. If the enquiry necessitates the transmission of a telegram to another station an additional charge will be made at the ordinary inland rate for the telegram and the reply.

The abbreviations used in the reply radiotelegram are shown below.

3. *Meteorological Reports.**

Information as to (1) the state of the weather in various parts of the Eastern Atlantic, the Uuited Kingdom, and the Continent, (2) weather forecasts for any part of the British Coasts, or (3) ice in the Atlantic can be obtained by wireless telegraphy through the post office coast stations from the Meteorological Office. The radiotelegram of enquiry should be worded as follows :—

Indicate (1) Weather, or (2) Forecast, or (3) Ice at . . . . . Meteorological. Captain . . . . . .

The shore station and Meteorological Office charge for the radiotelegram and its reply will be 5*s*. 6*d*., in addition to the cost of the inland telegram to the Meteorological Office and of the reply.

All radio-telegrams sent to the coast stations in connection with these services must be forwarded in the name of the captain of the ship, and the shipowner will be held responsible for the charge incurred under sections 2 and 3.

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* The Meteorological Office is open between the hours of 8.30 a.m. and 8 p.m. on week-days, and between 6 p.m. and 8 p.m. on Sundays. Forecasts are prepared at 10 a.m. and 7 p.m. daily, and during the summer months at 2 p.m. also.

In order to furnish the information in the most convenient form the reply message will—if no special particulars are required—be sent as in the following examples :—

(1) S.W. 7, b, c, q, sea 5, fog 0.
(2) Calm, b, sea 0, fog 1.

This would indicate :—

(1) S.W. wind, strength 7, blue sky, detached clouds, squally, rough sea, no fog or mist.
(2) Calm, blue sky, sea calm, mist.

The abbreviations denoting the state of the weather and force of the wind will be as follows :—

State of the Weather.

b Blue sky.
c Clouds (detached).
d Drizzling rain.
e Wet air without rain.
f Fog.
g Gloom.
h Hail.
l Lightning.
m Mist.
o Overcast sky.
p Passing showers.
q Squalls.
r Rain.
s Snow.
t Thunder.
u Ugly (threatening sky).
v Visibility ; objects at a distance unusually visible.
w Dew.
z Haze.

NOTE.—A figure preceding a letter shows how many hours that style of weather had prevailed since last observation, thus—4 r means four hours' rain, 2½ l means two and half hours of vivid lightning, &c. It is well to bear in mind that w = dew, but d = drizzle, and e = wet without rain, p = passing showers of rain, and q = squalls, but s = snow, h = hail, but z = haze.

Scale of Fog Intensity.

Scale.	Name.	On Sea.	On River.
0	No fog or mist ...	Horizon clear.	
1	Light fog or mist	Horizon invisible, but lights and landmarks generally visible at working distances.	Objects indistinct, but navigation unimpeded.
2 } 3 }	Moderate fog ...	Lights, passing vessels, and landmarks generally indistinct under a mile. Fog signals are sounded.	Navigation impeded, additional caution required.
4 } 5 }	Thick fog ...	Ships' lights and vessels invisible at ¼ mile or less.	Navigation suspended.

Sea Disturbance Scale.

Scale.	Description.	Height of Waves in Feet from Crest to Trough.	Condition of Surface.	Scale.	Description.	Height of Waves in Feet from Crest to Trough.	Condition of Surface.
0	Calm	—	Glassy.	5 } 6 }	Rough to very rough.	5 to 10 feet	Much disturbed ; deeply furrowed.
1 } 2 }	Smooth	—	Rippled.	7 } 8 }	High to very high.	11 to 15 feet 16 to 35 feet.	Rollers with steep fronts.
3 } 4 }	Slight to moderate.	Under 5 feet	Rocks buoy or small boat ; furrowed.	9 } 10 }	Phenomenal	36 feet and above.	Precipitous ; towering.

Wind Force.

Figures to denote Force of Wind.	Description of Wind.	Mode of Estimating on board Sailing Ships.	Equivalent Velocity of Wind in Miles Per Hour.
0	Calm	... ...	0
1	Light air	} Sufficient wind for working ships ... {	2
2	Light breeze ...		5
3	Gentle breeze ...		10
4	Moderate breeze ...	} Forces most advantageous for sailing with {	15
5	Fresh breeze ...	leading wind and all sails drawing.	21
6	Strong breeze ...	} Reduction of sail necessary with leading {	27
7	Moderate gale ...	wind.	35
8	Fresh gale	} Considerable reduction of sail necessary, {	42
9	Strong gale	even with wind quartering.	50
10	Whole gale	} Close-reefed sail, running or hove to {	59
11	Storm	under storm sail	68
12	Hurricane	No sail can stand, even running	above 75

Exhibits at the Royal Statistical Society's Reception.—Twelve developable globes of the $1 : 8 \times 10^7$ size exhibiting distribution of meteorological elements over the oceans for February and August were prepared for a conversazione at the Royal Statistical Society on June 13th. A year's set of charts from the Monthly Weather Report were included in the exhibit as illustrations of the method of dealing with meteorological statistics.

Reports of Work, May and June.—1. *Marine Division.*—Data for islands in the South Indian Ocean completed for Admiralty ; data for Baltic in preparation. 60 meteorological logs, 1 lighthouse register, 293 North Atlantic registers, 137 radio-telegraphy registers, and 42 Indian Ocean registers examined. Issue of the North Atlantic Meteorological Chart for June, 1911, completed. July issue began on June 15th. Indian Ocean Meteorological Chart published for July; August signed for press, September in the press. Extension of July and subsequent charts to 125° E. (vii.).—Preparing reductions of Daily Weather Charts of the Antarctic Seas. The Charts for October to December, 1901, and the whole of 1902 and 1903 are now passing through the press, and the reductions of January, 1904, are ready for the lithographer. In the press 27 months, ready for press one month, still to do two months. Preparing mean monthly charts for the period October, 1901, to March, 1904, inclusive, and 12 charts showing monthly averages. Collating observations, December 6th to 11th, 1909, for International Commission for Aeronautics. Preparing 12 small globes to illustrate meteorological averages for Coronation Exhibition.

2. *Forecast Division.*—(1) Current work on the Daily, Weekly, and Monthly Weather Reports and on the Atlantic Charts has been kept up to date.

(2) Number of wireless messages received :—

	May.	June.
H.M. Ships	9	1
Mercantile Marine	405	397

Those received from H.M. Ships have been reported each week to the Admiralty.

(3) Correction to Daily Weather Report for April issued, May prepared.

(4) Forecast Checking. The work is completed up to the end of April.

(5) Tabulation of gradient wind velocities for four stations, completed up to end of 1910.

(6) Wind frequency tables prepared to end of April, checked to end of December.

(7) Working charts prepared for binding up to April 4th.

(8) The number of inquiries answered has been as follows :—

	May.	June.
Prepaid Replies	15	33
Telegraphic Inquiries (application by letter or personal)	5	20
Inquiries by telephone	5	10
Personal (answered immediately)	1	3

(9) Admiralty Forecasts.—Forecasts have been sent each day to—

Admiral, Home Fleet, twice daily.

Naval Aeronautical Department, Barrow.

Officers in Command, Devonport, Portland and the Nore.

H.M. Ships within range of wireless telegraphy,

and to the Commodore of the Royal Yachts, as requested.

Expenditure incurred by M.O. on behalf of the Admiralty in sending telegrams amounted 9*s.* 11½*d.* in May and £1 0*s.* 0½*d.* in June, the latter sum including 6*s.* 6½*d.*, the charge for telegrams to the Commodore of the Royal Yachts.

(10) Harvest forecasts have been issued regularly during June. Applications have been received from 72 persons up to the end of June.

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, Part I., II., and Part III., Section i., up to date. Part III., Section ii., January issue circulated in proof. Further progress with arrears in the work for the Library. 40 cards proposed for the Catalogue. Preparation of Annual Report and Appendices. Issue of weather notes in connexion with agricultural shows at Yeovil, Thame, Newton Abbot, Cardiff, Nottingham, Weymouth and Norwich. Inquiries (May and June, 1911), as follows : Newspapers, 16 ; Legal, 19 ; Scientific and Commercial, 89 ; Forecasts, 6 ; General, 3. The receipts in connection with these amounted to £14 7*s.* 10*d.*

Report by Mr. Gold on Library Catalogue and Shelf Numbering.—The books of the Library are arranged on the shelves according to the plan arranged before the removal from Victoria Street, but it has not been possible to renumber the books and alter the cards.

There is an author-catalogue for all the books and papers in the library, about 21,500 in all. For about 16,000 books this is a card-index.

There is a subject-catalogue according to the International plan for all books made 1906 about 2,500 in all. This is a card-index.

There is a subject-catalogue for certain books, prior to 1880, estimated at about 5,000. The catalogue is a book which includes also the author-catalogue for these 5,000 books. The arrangement of the subjects differs materially from that of the International Catalogue, and it is desirable that we should have a uniform arrangement in order that the best advantage may be taken of the subject-catalogue.

There are therefore about 14,000 books for which a new subject-catalogue should be made, and about 5,000 for which the subject-catalogue should be modified. I think this work ought to be done at the same time as the books and cards are re-numbered. I estimate that an efficient assistant who could give his whole time to the work would be able, with the assistance which the present staff could spare, to complete the work in a year.—July 5, 1911.

4. *Instruments Division.—Observatories.*—Preparation of Part IV. of Year Book for 1911 for the printer: The January sections have been passed for press; the copy for February, in C.G.S. units, is completed, and the conversion of the copy for March and April into C.G.S. units is in hand.

The boxes containing the sunshine records for the 31 years, 1880–1910, have now all been stacked in their places in the basement.

The examination of the observatory returns, checking the measurements of the sunshine cards, and tabulation of the rainfall and wind records, have been kept up to date.

The curves and tabulations, received from the observatories, have been satisfactory.

Not much progress has been possible with the summaries of hourly readings at the four observatories—Programme XV. (1871–1905).

The present position of this work is as follows:—

(1.) The differences in the daily and hourly means of pressure and temperature have been extracted with a view to obtaining their relation to each other.

(2.) The variation of the daily mean from the mean of the maximum and minimum of temperature has been similarly obtained.

(4.) The hourly variation in rainfall and the number of rain-hours have been obtained for five-year periods, and the number of rain-hours in 35 years is now in hand.

(5.) The diurnal variation of sunshine has been begun, but is not far advanced.

Instruments.—The usual Admiralty and office work. Some new instruments were sent for the transfer to the coast guard of the reporting station at Wick.

During the period eight boxes were despatched for the return of meteorographs found; and storm-warning cones were renewed at Lerwick, New Ferry, Sheringham, Bridlington, Eastbourne and Burntisland.

Some time was occupied in fitting up the charts and instruments forming the Meteorological Office exhibit at the Coronation Exhibition.

Instruments have been supplied against repayment to 10 persons or institutions.

Eleven requisitions have been received from the Crown agents for the colonies. One requisition was also received from the Department of Agriculture, Barbados; and one from the Union of South Africa for the Transvaal.

Eight colonial requisitions are still in hand.

Publications.—Report for May and June from Clerk of Publications :—

Publications received :	
Daily Weather Report	750 daily.
Weekly Weather Report	375 weekly.
Monthly Weather Report &c.	April and May, 525 each.
Daily Observations	February, March and April, 200 each.
Hourly Readings	None.
Monthly Meteorological Charts (Atlantic)	600 per month in weekly issues to July (3).
Monthly Meteorological Charts (Indian)	350 per month (to July).
International Cloud Atlas, 2nd Edition...	100.
Publications issued (or reserved for stock) ;—	
Current Publications :	
Daily Weather Report	746 daily.
Weekly Weather Report	324 weekly.
Monthly Weather Report	439.
Daily Observations	172.
Hourly Readings	None.
Monthly Meteorological Charts (Atlantic)	June, 314; July, 357.
Monthly Meteorological Charts (Indian)	June, 231; July, 235.
Back numbers and other Publications :	
Monthly Meteorological Charts (Atlantic)	500.
Do. do. do. (Indian)	147.
Hourly Readings (1910 volume)...	158.
Do. do. (back numbers)	10.
Daily Observations	12 and 6 monthly parts.
Presentations to Marine observers	96.
Amount received or due from occasional sales	£3 0*s.* 5*d.*

New publication: Report of the Berlin meeting of the International Meteorological Committee—The English translation is ready for the printer.

Observatories.—Kew.—The usual routine work has been carried out, and tabulated data from the meteorological curves have been sent weekly to the Office.

Observations of the three magnetic elements have been made weekly, and absolute observations of potential gradient have been made on about half the days. Some check observations of potential with a different apparatus have been made which tend to confirm the satisfactory working of the apparatus regularly in use.

Observations have been made with the Ångström pyrheliometer near noon (11 days May, 13 days June).

The Wilson electrometer was sent to the Cambridge Instrument Company for repairs, to be carried out to the instructions of Mr. C. T. R. Wilson, and has only just returned.

The Ebert apparatus has been brought into use and a good many observations have been made with it, involving the expenditure of a considerable amount of time.

The experimental observations on "Marine" barometers and the extraction of fog data for Mr. Gold's research have been proceeded with. The volume entitled "Summaries of results of Geophysical and Meteorological Observations for the year ended 31st December, 1910, at Kew Observatory . . . ." is now printed and ready for issue.

A meeting of the Gassiot Committee was held at the Observatory on May 31st.

Quick magnetograph runs in connection with the Antarctic Expedition under Captain Scott were made successfully on May 22, 26, 29 and June 2, 19, 23, 26 and 30.

At Dr. Mawson's request, a scheme of quick runs has been drawn up for use in connection with his Antarctic Expedition in 1912.

Eskdalemuir.—Azimuth of Mark. Several excellent opportunities of observing the Pole Star occurred in May :—

		Azimuth of Mark.
Results—11th May	... ...	8° 12′ 22″, W. of S., 6 observations.
18th May	... ...	8° 12′ 42″, W. of S., 4 observations.
20th May	... ...	8° 12′ 26″, W. of S., 6 observations.
Mean	... ...	8° 12′ 30″, which is the value actually in use at present.

Meteorological Work.—The normal work has continued in good order. A new black ink is being used for the anemograph with good results. I have now arranged for the end of eclipse in the barograph to occur exactly at the hour instead of two minutes past.

Magnetic.—The discontinuity at changing times in the V.F. magnet has now entirely disappeared. On two occasions what look suspiciously like discontinuities have occurred during the night and must be set down to some change in the pier due to temperature change. A second magnetograph is being made. I regret to say that the quick runs on 2nd and 19th June were lost, owing to stoppage of the clock. I was absent on 2nd, but present on 19th, and discovered that the cause was due to jamming of the clock string between the rim of the barrel and the next coil.

Seismology.—A new optical arrangement has been fitted to the Milne seismograph with excellent results.

Electricity.—The repaired Ebert apparatus was returned on 15th June. Several improved adjustments have been added, but to my regret the sensitiveness of the electrometer has been reduced to about half. We could have done with greater instead of less sensitiveness. The scale value of the recording Dolezalek appears to be slowly diminishing as compared with the high potential Wulf, but I am inclined to suspect that the Wulf is altering. I am most anxious that the new Wulf should come so that test may be made.

Accounts.—Late Observer at Wick.—Mr. H. Sinclair, of 321, Camden Road, London, N., has written (M.O. 1838) with reference to the discontinuance of the station at Wick in charge of his sister, Miss Jessie Sinclair, which was transferred to the Coast Guard during Mr. Lempfert's visit on May 18th to 20th, asking for a bonus on the termination of the service, and also that Miss Sinclair might be allowed to keep the screen and instruments on the ground that they had been "about our home since the days of our childhood."

Mr. James Sinclair became reporter for the office on June 5th, 1872. He died in 1904 (M.O. 2798/04), and Miss Sinclair, who had been acting as observer during her father's illness, was allowed to continue the observations until more suitable arrangements could be made.

It is proposed to reply that the Committee are unable to make a grant or bonus to Miss Sinclair on the termination of the work of reporting; that the instruments may be left in Miss Sinclair's charge for the time being, until the office requires their use elsewhere.

Approved.

Outstanding Accounts.—The cashier reports that outstanding accounts for the period May 30th, 1906, to January 14th, 1910, amounting to £5 15*s.* (including a charge of £4 against L. Williamson for a fishery barometer in Shetland which had been in his charge and was not forthcoming), are irrecoverable, and permission is asked to write them off.—Approved.

The cashier reports also an item amounting to £22 14*s.* 8*d.* outstanding against the Newspaper Weather Bureau, and a letter (M.O. 1769) asking for the supply of information to be continued upon the payment of £3 on the 15th of each month until the debt is cleared off.—Approved.

Travelling Expenses.—The Director's travelling expenses, amounting to £7 7*s.* 3*d.*, for a journey to Eskdalemuir, April 7th to 10th, were approved.

Audit of Stock of Instruments.—Captain Hepworth reports the following audit of the stock of instruments in the office on 31st March, 1911 (*see* Minute 168) :—

Report on Examination of Ledgers relating to Stock of Instruments and Verification of Stock.

(APPENDIX V.)

I hereby certify that I have examined the ledgers relating to instruments issued, and the stock of instruments available for issue on the 1st April, 1911, (1) to Stations; (2) to ships of the

Mercantile Marine balanced to that date; and that I have counted the respective instruments in stock and have found the balances recorded to be correct; also the statements attached under the following headings:—

Instruments supplied, &c., to the Mercantile Marine; Disposition of Mercantile Marine Instruments, 1st April, 1911; Instruments at Stations, viz.: Telegraph Reporting Stations, Observatories, Fishing Villages, &c., (*a*) Thermometers and Screens, (*b*) Other Instruments; Stock Account of Instruments received and issued on repayment to the Crown Agent for the Colonies, Colonial Governments and other Observers from 1st April, 1910, to 31st March, 1911.

Given under my hand this 7th day of June, 1911.

CAMPBELL HEPWORTH,
Marine Superintendent.

The Director.

APPENDIX V.

INSTRUMENTS supplied, &c., to the MERCANTILE MARINE.

Particulars.	Barometers.	Thermometers.	Hydrometers.	Screens.
April 1st, 1910, afloat	206	1,170	780	210
Issued since	53	390	193	40
	259	1,560	973	250
Returned since	67	350	174	37
	192	1,210	799	213
Written off as lost, &c.	—	190	170	35
April 1st, 1911, afloat	192	1,020	629	178

DISPOSITION of MERCANTILE MARINE INSTRUMENTS, April 1st, 1911.

Particulars.	Barometers.	Thermometers.	Hydrometers.	Screens.
In merchant ships	182	1,020	629	178
„ store at M.O.	8	8	12	12
At Liverpool Agency	2	29	22	4
„ Glasgow „	8	52	29	7
„ Dundee „	4	18	—	2
„ Hull „	4	26	15	7
„ Cardiff „	—	6	8	2
„ Southampton „	6	16	27	7
„ Sunderland „	2	9	7	3
Total, April 1st, 1911 ...	226	1,184	749	212
Under repair, April 1st, 1911 ...	6	9	—	6

INSTRUMENTS at STATIONS, viz.: Telegraphic Reporting Stations, Observatories, Fishing Villages, &c.

(*a*) THERMOMETERS AND SCREENS.

—	Thermometers.					Screens.
	Ordinary.	Maximum.	Minimum.	Solar.	Grass Minimum.	
April 1st, 1910, in use	379	77	72	10	12	119
Issued since	40	5	5	1	1	5
	419	82	77	11	13	124
Returned since	21	2	4	—	—	1
Written off	—	—	—	—	—	1
April 1st, 1911, in use	398	80	73	11	13	122

(*b*) OTHER INSTRUMENTS.

—	Barometers.	Aneroids and Barographs.	Sunshine Recorders.	Rain Gauges.	Anemometers.	Storm Signal Cones.
April 1st, 1910, in use	320	36	37	99	31	223
Issued since	7	3	1	4	1	12
	327	39	38	103	32	235
Returned since	7	—	2	2	2	—
Written off	—	—	—	—	—	10
April 1st, 1911, in use	*320	39	36	101	30	225

STOCK ACCOUNT of INSTRUMENTS received and issued on repayment to the Crown Agents for the Colonies, Colonial Governments, and other Observers, from 1st April, 1910, to 31st March, 1911.

—	Thermometers.*					Thermograph.	Stevenson's Screens.	Tropical Screens.
	Ordinary.	Maximum.	Minimum.	Solar	Grass Minimum.			
Stock, April 1st, 1910 ...	33	9	14	5	12	12	1	8
Received since	676	180	183	64	35	22	21	1
	709	189	197	69	47	34	22	9
Issued since	590	166	184	64	40	33	16	3
Stock, April 1st, 1911 ...	119	23	13	5	7	1	6	6

—	Barometers.		Rain Gauges.	8-inch Glasses.	5-inch Glasses.	Sunshine Frames.	Sunshine Balls.	Cones.	Hygrographs.
	Mercurial.	Graphs.							
Stock, April 1st, 1910 ...	5	1	21	13	10	8	6	5	1
Received since	49	36	148	360	204	3	9	25	3
	54	37	169	373	214	11	15	30	4
Issued since	44	37	156	361	203	7	10	18	3
Stock, April 1st, 1911 ...	10	—	13	12	11	4	5	12	1

* 224 barometers (mercurial) and 1 barograph are lent for the use of seafaring communities at fishing villages and ports.

Submitted—The following statement :—

	£	*s.*	*d.*
Bank balance on 30th April, 1911	4,736	11	7
Receipts from 1st May to 30th June, 1911	1,384	7	10
	6,120	19	5
Cheques drawn from 1st May to 30th June, 1911	4,521	8	1
Bank balance on 30th June, 1911	1,599	11	4

Submitted—The following Statement of Accounts for the Quarter ending 30th June, 1911 :—

RECEIPTS.						PAYMENTS.				
1910. £ s. d.		£ s. d.		1911. £ s. d.	1910. £ s. d.		£ s. d.		1911. £ s. d.
2,206 14 8	Balance from year 1910–11	—		1,298 16 3	250 0 0	Director	—		250 0 0
4,187 10 0	Parliamentary vote.	—		4,212 10 0					
					1,876 7 1	OFFICE SALARIES : Clerical Staff, monthly	1,929 2 9		
					142 9 0	„ „ weekly	164 10 8		
	M.O. OBSERVATORIES :								2,093 13 5
—	Kew	354 3 7				M.O. OBSERVATORIES :			
—	Eskdalemuir ...	504 0 0			1 1 0	Kew	461 6 7		
8 15 0	Valencia	8 15 0			—	Eskdalemuir	262 7 8		
				866 18 7	114 16 8	Valencia	114 1 3		
									837 15 6
	DEPARTMENTAL EXPENSES REPAID :								
52 6 0	Forecasts, &c ...	53 19 0				OFFICE EXPENSES :			
	Marine, Statistics, and Observa-				185 11 2	Rent, Fuel, &c. ...	170 17 6		
14 1 0	tories	30 8 5			37 6 7	Furniture, Fittings, &c.	264 10 10		
13 2 10	Instruments ...	8 16 2			88 10 10	Incidental	124 9 5		
				93 3 7					559 17 9
	INCIDENTAL EXPENSES REPAID :					POSTAGE AND TELEGRAMS :			
73 14 4	Forecasts, &c. ...	85 18 1			65 14 11	General Postage ...	75 17 11		
31 16 2	Other Branches ...	19 12 8				Postage of Daily			
	Stationery Office				83 10 10	Weather Reports ...	87 4 8		
13 0 6	Account ...	11 17 11			530 11 6	Telegrams, &c. ...	674 12 3		
				117 8 8					837 14 10
	TELEGRAPH CHARGES REPAID :				62 11 5	TRAVELLING EXPENSES AND INSPECTIONS...	—		65 11 0
76 14 1	Home	146 14 6			258 0 0	SUPERANNUATION ...	—		258 0 0
	Telegrams sent								
14 1 3	abroad	76 0 0				COST OF INSTRUMENTS :			
				222 14 6	142 1 7	Royal Navy	88 8 2		
	INSTRUMENTS :					Mercantile Marine,			
—	Royal Navy ...	1 10 0			428 9 8	Stations, &c. ...	354 2 1		
	Mercantile Marine,								442 10 3
516 14 1	Stations, &c. ...	288 6 10				AUXILIARY OBSERVATORIES, &C.	—		
				289 16 10	577 13 10				482 10 2
	OBSERVATORY								
12 5 0	FORMS, &C. ...	—		32 18 6	140 18 5	LECTURES AND EXPERIMENTS	—		68 0 5
	SUPERANNUATION ACCOUNT :					ANTARCTIC METEOROLOGY			
141 5 0	Annuities	141 5 0			10 5 2		—		—
	Interest on Invest-								
14 10 4	ments	22 10 4				BALANCE :			
				163 15 4	2,461 12 10	Cash at Bank ...	1,599 11 4		
					41 0 11	„ at Office ...	48 7 6		
	LECTURES AND EXPERIMENTS ...	—				Advance for Inspec-			
137 3 2				245 9 11	15 0 0	tions...	—		
									1,647 18 10
£7,513 13 5				£7,543 12 2	£7,543 13 5				£7,543 12 2

LIABILITIES.			ASSETS.		
£ s. d.		£ s. d.	£ s. d.		£ s. d.
1,290 13 0	To sundry creditors	1,543 19 11	2,502 13 9	By cash at Bank and at Office ...	1,647 18 10
—	„ salaries reserved	23 18 2	167 1 7	„ Admiralty	111 18 2
77 6 3	„ superannuation	67 6 3	135 1 1	„ M. O. Instruments in Stock ...	267 17 5
1,813 17 10	„ balance	893 13 7	377 0 8	„ sundry debtors	501 3 6
£3,181 17 1		£2,528 17 11	£3,181 17 1		£2,528 17 11

NOTE.—On 30th June the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £3,603 2*s.* 1*d.*

THIRTY-EIGHTH MEETING.

South Kensington, London, S.W., 1st November, 1911.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	CAPTAIN HARVEY.
SIR G. H. DARWIN.	THE HYDROGRAPHER.

MR. MIDDLETON.

311. The Minutes (302–310) of the last Meeting (5th July, 1911) were read and confirmed.

312. *Audit of Accounts for* 1910–11.—The Director reported that the accounts for the year ended 31st March, 1911, had been audited by Mr. W. W. Hunter, of the Exchequer and Audit Department, who had, in the course of his examination, paid particular attention to the accounts of the stock of instruments of all kinds in possession of the Office. Upon his suggestion the following order had been issued :—

177 : *Audit* 1910–11.—The following orders are by request of the Audit Department :—

1. Packing cases are to be accounted for by being entered in the ledger on receipt and issue. [Each packing case sent by carrier is to be numbered and a packing card is to be enclosed, with corresponding arrangement for instruments sent by post or by hand.]
2. Agents' reports are to be compared with the ledger accounts and differences examined.
3. A list or ledger account of instruments written off is to be kept.
4. An inventory of instruments in operation or in store as historical or disused is to be made and kept up to date. This inventory will form the completion of the catalogue of the Museum.

W. N. SHAW.

28th October, 1911.

313. *New Office* (Minute 305).—(a) *Post Office Charges.*—Reported—the following letters to the Treasury and Post Office respectively and accompanying memorandum in accordance with Minute 305 :—

LETTER (P.C. D431) TO H.M. TREASURY.

SIR, 21st September, 1911.

IN continuation of the subject of my letter of 31st July, 1911, I have now the honour to ask you to lay before Their Lordships a representation with reference to the International Service of Meteorological Telegraphy.

2. The removal of the work of the Office to South Kensington and the arrangements there made for the receipt and despatch of telegrams have brought into prominence certain points in connexion with the telegraphic service to which the Committee wish to draw attention.

3. The service, in the aggregate, covers about 80,000 telegrams a year, of which about 50,000 belong to the part of the service associated with the international exchange of weather telegrams for Europe.

4. The international weather service has been gradually developed during the past 50 years, and is now of a complicated character. A memorandum has, therefore, been prepared to show the present position of the service, and to indicate certain points in which improvement might be expected. A copy of the memorandum is enclosed herewith.

5. The status of the Meteorological Office with regard to its telegraphic work is simply that of a private individual or company. The experience which the Committee have gained since their appointment has proved that this status is not suitable for an Office which is charged by Government with the duty of acting in co-operation with all the Governments of Europe and, if necessary, of the world in the development of an international system of weather telegraphy. The Committee are convinced that for the efficient working of an international system it is necessary for weather telegrams to become entitled to special consideration by the Post Office. They are not raising here any financial question. Financial considerations can always be met by a suitable payment. The disabilities under which the work is done suggest reconsideration from the administrative point of view.

6. The Committee submit that the successful prosecution of their work requires that they should have priority of transmission for the telegrams which form part of the international system. The general grounds for this opinion are as follows :—The messages are not ordinary telegrams and cannot be used separately. The observations which they report have to be combined upon synoptic charts which are only properly effective when they are complete ; the time required is therefore set by the

latest arrivals. The simultaneous preparation of these charts from the same data in 20 European capitals is a remarkable international achievement. It depends upon the successful co-operation of all the telegraph services of Europe. It is inevitable on occasions that some messages should be missing on account of the interruption of communications, but the forecasters who are waiting for the messages to prepare their maps have no direct means of knowing the condition of the telegraph services, and when to the unavoidable omission due to breakdown which can be reported, are added incidental and uncertain delays due to the casual pressure of business at any one station or telegraphic centre, the meteorological staffs in every capital of Europe have to do their work in a state of uncertainty which is prejudicial to the efficiency of the whole system. Hence, all the co-operating Governments are under a mutual obligation to avoid causes of delay as far as possible. For this country the work of transmitting the telegrams is spread over two hours and a half, and there is good reason for believing that with priority it could be completed within an hour and a quarter or even within an hour.

7. The delay is largely accounted for by the fact that in this country the meteorological messages have to take their turn with those of the general public, and are, in consequence, subject to irregular delays. The whole international service is thus to a certain extent disorganised. The disability is most keenly felt at times of public holidays of which the Coronation week was a conspicuous example. At all times of public holiday the forecast staff of the Office have to forego their own holidays because the demands of the public for weather forecasts are then exceptionally urgent; news agencies want special information, and they, as well as printers and all auxiliary agencies, ask for exceptionally early delivery; the attention of the public is closer and more interested than at other times, and punctuality in the delivery of the telegrams is therefore of exceptional importance. But in the absence of special privileges at those times the telegrams are subject to exceptional delay. On the 20th June, 1911, it was hardly possible to issue an evening report to newspapers owing to the delay of the telegrams. On the 22nd the Harvest Forecast Service fell through because no telegrams arrived. The experience is very discouraging, and the staff cannot but feel that, in response to the public demand, their holidays are sacrificed with very inadequate result. Yet in these matters the Office is obliged to maintain a strict standard. Public holidays are not on identical days for all the co-operating countries, and the suggestion that in any one country they only happen occasionally and a little dislocation may then be tolerated would bring the international scheme to an end.

8. The Committee have used all endeavours to make their system efficient under present conditions. One of the reasons for changing the hour of observation to 7 a.m. from 8 a.m. was to secure the practical priority of unoccupied wires before the general public use of the telegraph service began. That plan has been partially successful for inland messages, but it has failed for foreign messages. They hoped for a considerable improvement from the juxtaposition of the Office with a Post Office, but in that they have been disappointed.

9. By reverting to the use of a private wire some part of the delay between the Central Telegraph Office and South Kensington might be saved, but the Committee submit that reserving a private wire day and night for a year is only a partial remedy, and is moreover only an indirect and inadequate way of securing a priority which could be given for meteorological messages at certain times of the day throughout the year without any serious inconvenience to the public.

10. In further support of the opinion that special privileges are required it will be sufficient to call attention to one or two points. First, the meteorological services which are most efficiently administered, viz, the joint service of the United States and Canada, and the service of the German Empire, have special Government privileges. In the United States and Canada the position is most advantageous, and the work is done with a promptitude which is an example to the world. In that case the meteorological services belong to Government departments and the telegraphs are real commercial undertakings: the exact opposite of this country, where the telegraphs belong to a Government department and the meteorological service is an imaginary commercial undertaking. The best illustration of the difference can be seen in the fact that on a day in September, 1909, the Director of the Canadian Meteorological Service (whose office is in Toronto), being in Winnipeg on business and wishing to prepare a weather chart on the spot, called at the Office of the Telegraph Company and intimated his wish. Between 7 a.m. and 8 a.m. next morning, as a matter of business, telegraphic reports from the whole of Canada and the United States were placed at his disposal without extra charge. The difference will be realised by imagining what would have happened if, on the same date, the Director of the British Meteorological Service had called at a western Post Office, say Galway, and asked for telegraphic materials for a weather chart of North-western Europe.

11. In the German Empire meteorological telegrams are Government telegrams and are granted priority within certain hours. Again the difference is best explained by illustration. When negotiations were started for wireless telegrams from liners, the Deutsche Seewarte, having the support of the Reichsamt des Innern, declined to have anything to say to any proposal unless priority for the meteorological telegrams was first conceded. It was conceded without any difficulty by the Marconi Company. The Seewarte having withdrawn, the British Meteorological Office is obliged to accept the reverse condition that if the meteorological telegrams are found to interfere with the ordinary traffic the arrangement will be revised. So far as can be judged the result has been unfortunate, and must now remain so. Meteorological telegrams from liners have ceased to be regarded as important messages by the wireless operators in comparison with the ordinary traffic, and any step in the direction of improvement can now be met by the Marconi Company with the requirement of payment at least at ordinary rates.

12. The Committee are of opinion that sooner or later it will be recognised that no Government can maintain a meteorological service of real efficiency unless they are prepared to give priority to the necessary telegrams, and they desire to urge that the recognition of the fact should no longer be delayed. So far as is known the United Kingdom is the only country in the world in which the Government meteorological telegrams are not Government telegrams, and this fact leads to much awkwardness in the conduct of international negotiations. Government privileges naturally involve Government restrictions of various kinds, but in every country except ours the Meteorological Service has the Government visibly at its back in all negotiations with foreign countries.

I am accordingly to ask that the privileges of priority may be granted (1) for the meteorological telegrams, numbering about 158 per day, which are transmitted to the Meteorological Office or from this country to the Continental Meteorological Offices, and which supply the data for the working meteorological charts of this and other countries, and (2) for the Storm Warning Telegrams transmitted from the Meteorological Office.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury, Whitehall, S.W.

LETTER (P.C. D432) TO GENERAL POST OFFICE.

SIR, 21st September, 1911.

WITH reference to Mr. Carey's letter of 12th April, 1911, I am authorised by the Meteorological Committee to say that they have given careful attention to the question of the use of the pneumatic tube now in operation at South Kensington for the transmission of telegrams between the Meteorological Office and the Post Office, as compared with the use of a private wire from the Central Telegraph Office. They note that the former involves costs for the special attendance of clerks which are assessed at £73 1s. a year, whereas the charge for a private wire with a printing instrument similar to those lately in use at 63, Victoria Street, would be £37 10s. a year. For reasons here given it would appear that a duplicate private wire and instrument would be required, so that the Post Office charge for conducting the telegraph business of the Meteorological Office by private wire may be set down at £75 a year.

2. For the purpose of reference a memorandum has been prepared setting forth in outline the service of weather telegraphy, with certain details which are of importance in the consideration of the questions now raised. It is shown that the service is an international service of exchange between this country and the Governments of the neighbouring countries, viz.: Portugal (including the Portuguese Islands), Spain, France, Belgium, Holland, Germany, Denmark with Iceland, Norway and Sweden. It will be understood that the staffs of each of the Meteorological Institutes in the Capitals of the several countries named, and in those of the other countries of Europe which derive their information about the meteorological conditions in the British Isles by re-transmission from Paris, Utrecht, or Hamburg, await daily the arrival of the meteorological telegrams from shortly after the hour of observation, viz., 7 a.m. G.M.T., until the information for that hour is complete.

3. The information received at any one of the Institutes must be completed before it can be effectively used. The meteorological work cannot be properly undertaken until the latest telegrams have arrived. Delay and irregularity in the arrival of the telegrams are, therefore, inconvenient to each one of the associated countries, and a mutual understanding for avoiding delay is essential to all the services. With suitable arrangements an hour-and-a-half should be sufficient for the transmission of the telegrams exchanging the information.

4. So far as the Meteorological Office is concerned, the circumstances which determine the effective period for the reception of the morning messages are first, the arrival of an Admiralty messenger who calls at 9 a.m., for forecasts for the use of the Fleet; secondly, the commencement of the printing of the Daily Weather Report at 11 a.m. in time for the copies to be folded and posted at the General Post Office at 1.30 p.m. Other circumstances operate in like manner to restrict the available time for the afternoon and evening reports. If telegrams are late the whole service of delivery must be postponed at great inconvenience, or the forecaster must attempt to work with insufficient data.

5. All the arrangements of the Office have, therefore, to be guided by the necessity for completing the morning information by 8.45 a.m., the mid-day by 2 p.m., and the evening by 7 p.m.

6. The number of telegrams which may be offered for delivery within the period specified is 65 to 85 in the morning, 14 to 20 in the afternoon, 68 to 80 in the evening. The lower numbers mentioned are taken from the memorandum referred to; the higher numbers are given in order to allow for a number of wireless telegrams which arrive spasmodically.

7. A single private wire with printing instrument cannot deal with so many messages in the hour. At 63, Victoria Street in times of pressure some messages were sent to a post office opposite and delivered by messenger. The full service would require two private wires at a cost of £75.

8. So far as the actual payment to the Post Office is concerned there is little to choose between the alternatives, but the charges for transmission of service messages between the Office and the Central Telegraph Office place the advantage from the point of view of economy of payment to the Post Office with the private wire. There is, however, another side to the question.

9. The service of a private wire has to be maintained for 13 hours a day (7.15 a.m. to 8.30 p.m.) and necessitates a staff of telegraphists. For the private wire at Victoria Street six members of the staff of the forecast division had to be trained to receive or send a telegram when called upon. But as the special service which requires a private wire is, or might be, practically limited to four hours a day, the wire would be practically idle for nine hours out of the thirteen, and the telegraphic staff employed on other duties. For a second private wire additional staff would be required.

10. It is not found in practice satisfactory to combine the duties of telegraphist with those of draughtsman, computer, or meteorologist, and it was in order to avoid the necessity for having a staff of only partially occupied telegraphists that the Meteorological Office arranged for the delivery of telegrams by pneumatic tube. The use of the public wires to South Kensington instead of a private wire or wires seems most appropriate, because the wires are chiefly wanted for meteorological messages from 7.15 to 8.30 a.m., and 6 p.m. to 8 p.m. when they are, as a rule, not wanted by the public, whereas they are nearly free of meteorological messages in the busy time from 9 a.m. till 6 p.m.

11. It is, however, found that the discontinuance of the private wire has cut off the means of informal communication with the Central Telegraph Office which was found to be in many ways convenient, and is, in fact, essential for the proper administration of the telegraphic weather service. This informal communication, which is now inappropriately represented by telegrams handed in as ordinary messages at South Kensington could be satisfactorily conducted through the Post Office

officials at South Kensington, or by the telephone between the Office and the Central Telegraph Office if the Postmaster-General would sanction such an arrangement. The Meteorological Committee would be prepared to pay an agreed sum in consideration of the accommodation.

12. The alternatives before the Meteorological Committee are (i) to continue the conduct of the telegraphic business of the Office by pneumatic tube at the cost of £73 per annum, in accordance with the letter under reference, and to ask the Postmaster-General to make special provision for the necessary informal communication with the Central Telegraph Office either by instructions to the telegraph clerks at South Kensington or possibly by telephone, for an agreed charge, and (ii) to install two telegraph instruments with private wires in the Meteorological Office at a rental of £75 a year, and to make the necessary addition to the staff in order to serve the additional instrument.

13. The Committee are of opinion that the first alternative is the better, and they therefore beg leave to ask the Postmaster-General to be good enough for an agreed charge, and in consideration of the fact that the Meteorological Service is a national and international service, to sanction the provision for the informal communication with the Central Telegraph Office, through his officials at South Kensington, which is necessary for an efficient service.

14. In present circumstances serious delay is caused occasionally by the pressure of business at the South Kensington Office, which would present an additional argument in favour of private wires, but the Committee have authorised an application to H.M. Treasury for a reconsideration of the status of meteorological telegrams which would meet the case.

I am, &c.,
W. N. SHAW.

The Secretary,
General Post Office, London, E.C.

MEMORANDUM ON METEOROLOGICAL TELEGRAMS.

I.—THE TELEGRAPHIC SERVICE OF THE METEOROLOGICAL OFFICE.

The telegraphic service of the Meteorological Office deals on the average with upwards of 200 telegrams a day, Sundays and holidays included, or about 80,000 telegrams a year. It consists of two main parts :—

A. The international daily service of telegrams exchanging meteorological observations between the various countries of Europe. The countries immediately concerned are Great Britain, Portugal, Spain, France, Belgium, Holland, Germany, Denmark and Iceland, Norway and Sweden, but the other countries of Europe are brought in by the re-transmission of telegrams by Hamburg, Utrecht, or Paris.

B The distribution of the information collected or of inferences drawn therefrom to various persons in the United Kingdom.

A.—*International Daily Exchange of Meteorological Observations.*

This part comprises :—

7 a.m. Service for the Daily Weather Report.

i. The transmission of 65 inward messages and 18 outward messages in code, reporting observations made, with one or two exceptions, at 7 a.m. G.M.T. at 29 stations in this country (25 official) and 45 stations on the continent of Europe or Atlantic Islands.

6 p.m. Service for Newspapers.

ii. A similar but more restricted service for reporting observations made at 6 p.m. for the preparation of storm-warnings and for forecasts, &c. issued to news agencies.

1 p.m. Service for Harvest Forecasts.

iii. A still more restricted service reporting observations made at 1 p.m. for storm-warnings and, during the summer, for Harvest Forecasts.

The daily summary of telegrams for this service with the hours over which it extends is as follows :—

Hours.	Inward Telegrams to M.O.		Outward Telegrams to Foreign Offices.	Total.
	Home.	Foreign.		
7.15 a.m. to 10 a.m. or later	29	36*	18	83
1 p.m. to 2 p.m. or later	14	2	10	26
6 p.m. to 7 p.m. or later	18†	12	8	38
Total	61‡	50	36	147

* Including a message received by wireless and telephone from Gibraltar.
† Exclusive of 38 telegrams from Health Resorts.
‡ Exclusive of wireless telegrams from His Majesty's Ships and Atlantic liners which number on the average 11 per day.

Most of the telegrams sent abroad or received from abroad are "collective" telegrams from central institutions reporting in one message observations from a number of stations.

The service is uniform throughout the year, Sundays and holidays included, except only that on Sundays, Christmas Day, and Good Friday, the 1 p.m. service is not operative.

For these telegrams, numbering 52,251 per annum, Government priority is sought. They are sent regularly every day at fixed hours which could be closely restricted for privileged telegrams. Such telegrams are Government telegrams in every country (including British Dominions) except our own.

In the United Kingdom they are already distinguished from messages sent by the general public by being handed in with special passes, they are therefore easily separated from messages which are not on the same footing. Of the latter may be mentioned 38 which are sent daily to the Office between 6 p.m. and 7 p.m. reporting observations at health resorts for communication to newspapers. For these punctuality is convenient but priority is not needed.

B.—*Telegrams conveying information from the Office to various persons in the United Kingdom.*

These are telegrams (numbering about 15,000 a year) which convey information in the form of storm warnings, forecasts, or otherwise, to naval dockyards, officers of the fleet, storm signal stations for public exhibition, or to private persons. They are irregular in the time of despatch as they depend upon the meteorological conditions. On general grounds when Government has made provision out of public funds for collecting information for the use of the public it seems unreasonable to allow the information to become belated and therefore useless by avoidable delays in transmission, but that matter concerns this country only and is therefore on a different footing from the telegrams referred to in Class A.

II.—The International Service of Weather Telegrams.

The international arrangements for meteorological telegrams to which this country is a party originated in an understanding between Admiral Fitzroy, representing a department of the Board of Trade, and M. Leverrier, the Astronomer of the French Imperial Government, in 1860. With the modifications and additions made since that time a complicated system has grown up. The telegrams are sent by Foreign Governments partly at their own expense, partly as concessions from Cable and Telegraph Companies, partly by courtesy of Cable Companies, partly in exchange for telegrams sent by the Meteorological Office and, in one instance, on repayment at rates adjusted to correspond with those charged in this country. Telegrams are sent in return partly from the separate stations, partly as collective messages from the Central Telegraph Office by arrangement with the Meteorological Office, and partly from the Meteorological Office. The Meteorological Office would like to introduce a number of changes into the system but hesitates to move in the matter without the co-operation of the Post Office because they do not know what the rights and obligations of this country are in respect of concessions and other arrangements with Cable and Telegraph Companies. For example in 1902 the Office was invited by the Portuguese meteorological representative at the Azores to accept a daily telegram as a Portuguese Government concession; communication with the Post Office resulted in a letter offering the message as a gratuity from a Cable Company liable to revocation which placed the matter on an entirely different footing. Moreover, in making satisfactory arrangements with foreign Government Services it is necessary to know what is possible and what is practicable to avoid delay in the transmission of telegrams since all progressive services regard an approach to certainty in the time of transmission as an essential factor in the consideration.

In this matter reciprocity between different countries and consequently uniformity of practice for all the co-operating countries is the only practicable basis. The following schedule has been prepared to show the items of the existing international service with the charges at present in operation and also the charges which would be payable if our own principle of payment for telegrams at scheduled rates were generally adopted.

International Service of Meteorological Telegrams, 1911.

Morning Service. Observations at 7 a.m. G.M.T.

Inwards.

No.	Country.	Name of station or number included in collective messages.	No. of words. Text + Address.	Basis of existing agreement.	Present charge to M.O.	Scheduled P.O. charge. £ s. d.
1	Iceland ...	First collective 3	12 + 2	Contract with G.N.T. Co., 1906	6,000 frs. per annum, 13*s.* 4*d.* per day.	0 19 10
2	Do. ...	Second collective 3	12 + 2			
3	Sweden ...	Collective ... 5	30 + 2	Voluntary concession G.N.T. Co., 1871.	Nil	0 6 8
4	Norway ...	Do. ... 3	18 + 2	Do. do.	Nil	0 4 2
5	Do. ...	Faerder	6 + 2	Do. do.	Nil	0 1 8
6	Denmark ...	Blaavands Huk ...	6 + 2	Do. do.	Nil	0 2 0
7	Do. ...	Skagen	6 + 2	Do. do.	Nil	0 2 0
8	Germany ...	Cuxhaven	6 + 2	Free by German Government ...	Nil	0 1 4
9	Do. ...	Collective ... 3	18 + 2	1886. Repaid by M.O. to Germany	3*s.*	0 3 4
10–26	France ...	Separate 17	Each 6 + 2	Free by French Government, 1879, in exchange for No. 48 and storm warnings.	Nil	1 6 8
27	Holland ...	Helder ... 20				
28	Belgium ...	Brussels ...				
29	Spain	Corunna ...				
30	Do.	Do.	6 + 2	Voluntary concession by Eastern Telegraph Co., 1886.	Nil	0 2 0
31	Gibraltar ...	Gibraltar	—	Wireless by Admiralty, 1910 ...	Nil	0 2 0
32	Portugal ...	Lisbon	6 + 2	Voluntary concession by Eastern Telegraph Co., 1886.	Nil	0 2 0
33	Do. ...	Oporto	6 + 2	Do. do.	Nil	0 2 0
34	Do. ...	Azores (Delgada) ...	6 + 2	Do. do. 1894	Nil	0 6 0
35	Do. ...	Azores (Horta) ...	6 + 2	Concession by Commercial Cable Co., 1902.	Nil	0 6 0
36	Do. ...	Madeira	6 + 2	Concession to Lisbon, thence by Eastern Telegraph Co., 1910.	2*s.*	0 8 0

Outwards.

37	Sweden *viâ* Norway.	Collective ...	3	18 + 2	Voluntary concession by G.N. Telegraph Co.	10*d.**	0 4 2†
38	Do.	Blacksod ...	1	6 + 3	Do. do.	4½*d.**	0 1 10½
39	Norway ...	Collective ...	4	24 + 2	Do. do.	1*s.*	0 5 5†
40	Denmark ...	Lerwick		2 + 2	Do. do.	2*d.**	0 1 0
41–45	Germany ...	Separate ...	5	15 + 10	Charged to M.O.	4*s.* 2*d.**	0 4 2
46–47	Do. ...	Do. ...	2	10 + 4	Do.	2*s.* 4*d.**	0 2 4
48	France ...	Collective ...	6	36 + 2	See No. 10–26. Special rate ...	3*s.* 2*d.*	0 6 4†
49–51	Holland ...	Separate ...	3	6 + 6	Special rate	1*s.**	0 2 0
52	Do. ...	Collective ...	6	8	Do.	8*d.**	0 1 4†
53	Belgium ...	Do. ...	2	4 + 2	Do.	6*d.**	0 1 0
54	Portugal ...	Valencia		6 + 2	Voluntary concession by Eastern Telegraph Co.	6*d.*	0 2 0

* Refunded to M.O by the foreign institutes.
† The minimum charge. The cost is increased if owing to delays from individual stations the message has to be sent in two or more parts.

The other countries of Europe are supplied with information by the re-transmission of the telegrams sent to Paris, Utrecht, or Hamburg.

37 and 39 are dispatched as one collective message of seven stations to Norway. Of these three stations (message 37) are retransmitted from Christiania to Sweden. The inland charges on these three messages are refunded to M.O. by the Swedish Institute.

AFTERNOON SERVICE. Observations at 1 p.m. G.M.T.

Inwards.

No.	Country.	Name of station or number included in collective messages.	No. of words. Text + Address.	Basis of existing agreement.	Present charge to M.O.	Scheduled P.O. charge.
						£ *s.* *d*
55	Norway ...	Skudesnaes	3 + 2	Voluntary concession by G.N. Telegraph Co.	Nil	0 1 0½
56	France ...	Isle d'Aix	3 + 2	French agreement	Nil	0 0 10

Outwards.

57	Norway ...	Aberdeen		2 + 3	Free over G.N. Telegraph Co. ...	2½*d.*	0 1 0½
58	Do. ...	Lerwick		2 + 3	Do. do. ...	2½*d.**	0 1 0½
59–63	Denmark ...	Separate ...	5	10 + 10	Do. do. ...	10*d.**	0 5 0
64	Germany ...	Collective ...	3	6 + 2	Charged to M.O.	1*s.* 4*d.**	0 1 4
65	France ...	Do. ...	2	4 + 2	In exchange for 56. Special rate	6*d.*	0 1 0
66	Holland ..	Do. ...	3	8	Special rate	8*d.**	0 1 4

EVENING SERVICE. Observations at various times, 6 p.m. in U.K.

Inwards.

67	Iceland ...	Collective ...	6	24 + 2	Contract with G.N. Telegraph Co. See 1.	Included in 1 and 2.	0 18 5
68	Sweden ...	Stockholm		2 + 2	Voluntary concession by G.N. Telegraph Co.	Nil	0 0 10
69	Norway ...	Skudesnaes		3 + 2	Do. do.	Nil	0 1 0½
70	Do. ...	Christiansund ...		3 + 2	Do. do.	Nil	0 1 0½
71	Denmark ...	Skagen		3 + 2	Do. do.	Nil	0 1 3
72	France ...	Isle d'Aix		3 + 2	With No. 10–26	Nil	0 0 10
73	Do. ...	St. Mathieu		2 + 2	Repaid to Paris by M.O.	2*s.* 5*d*†	0 2 0
74	Do. ...	Biarritz		2 + 2			
75	Do. ...	Paris		2 + 2			
76	Holland ...	Helder		2 + 2	Repaid to Utrecht by M.O. ...	10*d.*	0 0 8
77	Portugal ...	Lisbon		2 + 2	Concession by Eastern Telegraph Co.	Nil	0 1 0
78	Do. ...	Azores...		4 + 2	Do. do.	Nil	0 4 6

Outwards.

79	Denmark ...	Collective ...	7	14 + 2	G.N. Telegraph Co.	8*d.**	0 4 0
80	Do. ...	Lerwick		2 + 2	Do.	2*d.**	0 1 0
81	Do. ...	Malin Head		2 + 2	Do.	2*d.**	0 1 0
82	Germany ...	Collective ..	7	14 + 2	Payment	2*s.* 8*d.**	0 2 8
83	Holland (Utrecht).	Do. ...	7	16	Do.	1*s.* 4*d.**	0 2 8
84	Do.	Lerwick		4	Do.	4*d.**	0 0 8
85	Holland (Amsterdam).	Valencia		5	Do.	10*d.**	0 0 10
86	Do.	Holyhead		5	Do.	10*d.**	0 0 10
						£2 7*s.* 0½*d.*	9 5 2

* Refunded to M.O. by the foreign institutes.
† Including porterage.

82 discontinued in summer; the evening observations are then incorporated in the morning messages 41 to 45, the payments for which are correspondingly increased.

83, 84. In summer these messages are distributed between two collective messages of 5 and 3 stations respectively.

Telegrams from this country to France, Belgium, and Holland (Utrecht) are charged at the special rate of 1*d.* per word. Payments for these telegrams are refunded to M.O. from Holland and Belgium.

In 1910–11 there were in addition 4,044 wireless telegrams from ships the scheduled cost of which would be £707 per annum. They were transmitted for the sum of £210 paid to the Marconi Company with £101 to the Post Office as the full charge for inland telegraphy.

It will be seen that the cost of the service upon the principle laid down by this country would be £9 5*s.* 2*d.* a day, about £3,380 a year (or £4,080 if the wireless telegrams be included); whereas only £2 7*s.* 0½*d.* is paid (£867 a year, or £1,178 including wireless telegrams). The difference depends mainly upon the services of two Cable Companies which, so far as we know, are voluntary. Negotiations on these questions require careful consideration, because the associated meteorological services stand to lose nearly £3,000 a year by the extension of the official principle of payment in full.

If a commuted payment could be made to the Post Office for meteorological telegrams this difficulty might be obviated without infringing the general principle of payment for services rendered and there need be no difficulty in adjusting the payment from time to time so that the Post Office revenue should not be the loser.

Modifications Required.

The scheme indicated in the previous section has been gradually compiled and it now requires revision. Apart from the general question of payment by means of a commuted sum the following are the changes which appear desirable for this country :—

Morning Inwards Service.

1. *The Telegrams from France* should be accelerated.

2. *The Telegrams from Helder, Brussels, and Corunna* come *viâ* Paris at the expense of the French Government. It is desired that these messages should come direct.

3. Of the 17 French messages four are not utilised. They might be discontinued, or the messages received in Paris from Rome, Vienna, and St. Petersburg might be substituted for them.

Morning Outwards Service.

4. In consequence of the establishment of observations at 7 a.m. at a number of stations in this country for Germany and the Netherlands, before the general change of hour of observation to 7 a.m., telegrams were sent from the separate stations direct to Hamburg or Amsterdam and they still continue, so that the observers send two telegrams. The stations concerned are Lerwick, Aberdeen, Stornoway, Shields, Holyhead, Valencia, Malin Head, Portland, Skegness, Scilly. These are the messages numbered 46–51. If these second messages go through London it would seem more economical for the telegraph service to send the information as collectives from London *provided they can be sent without delay.*

5. *Exchange with Spain.*—The arrangement with Spain is confused. The message from Corunna comes in duplicate, one copy (the earlier) *viâ* Paris and the other *viâ* Eastern Telegraph Company. Spain gets in return the Valencia observations sent from South Kensington to Lisbon (message 54) and transmitted thence to Madrid, but wants messages reporting three stations, and sent by the most direct route to Madrid. We, on the other hand, would like a message from Madrid, and for the Eastern Telegraph Company's message to be accelerated.

6. *Exchange with Canada.*—Another question in connection with the telegraph service is that of the desirability of an exchange with the Meteorological Office at Toronto. The Canadian Office at present uses information about European stations borrowed from Washington, and the Meteorological Office, for a corresponding purpose, borrows information from the Paris Bureau which comes by post and is therefore a day late. It is understood that Toronto would like to exchange messages daily with London, and the consideration of the matter is desirable, as other questions than meteorological ones are mixed up with an official exchange of information between Toronto and London.

Much of the work of the revision must be done by the Meteorological Office, but the co-operation and advice of the Post Office is needed.

Reported further—the receipt of the following letter (M.O. 2,621) from the Marconi Company, which raises again the point taken in the above memorandum as to the desirablity of making a commuted payment to the Post Office, adjusted from time to time, in lieu of payments on account rendered for detailed items :—

Marconi's Wireless Telegraph Co., Ltd.,
Watergate House, York Buildings, Adelphi, W.C.,
15th August, 1911.

Re *Wireless Weather Reports.*

Dear Sir,

With further reference to your letter numbered D14/2220 of the 9th instant, I am instructed to state that my company will have no objection to the inclusion of the Australian and New Zealand Passenger Steamers of the White Star Line, fitted with Marconi Apparatus, in the list of ships sending Weather Reports to your Office.

At the same time we would state that should the Meteorological Office contemplate paying any additional sum to the Post Office authorities in respect of the messages transmitted by these vessels, we should of course expect to receive our proportionate share.

We beg to remain, &c.,

MARCONI'S WIRELESS TELEGRAPH CO., LTD.
ADRIAN SIMPSON.
For Deputy Manager.

The Director,
Meteorological Office,
South Kensington, S.W.

It was decided to defer further action with reference to the matter until replies had been received to the letters printed above.

(b) *Upkeep of Heating and Lighting Installations.*—The Director reported—that after an interview with the representatives of the Supplies Division and Engineering Division of the Office of Works he had accepted a charge for the upkeep of heating and lighting installations as set out in the appended letter (M.O. 2,266) as being in accordance with the terms of the lease, although the estimated cost to the Office, viz., £50 per annum is more than would have been expected for repairs requiring special workmen for similar apparatus in private establishments :—

H.M. Office of Works,
Storey's Gate, Westminister, S.W.,
13th July, 1911.

SIR,

I AM directed by the First Commissioner of His Majesty's Works, &c., to inform you that the Board have had under their consideration the question of the incidence of charge between the various departments in occupation of the Meteorological Office Building at South Kensington of the cost of services performed by this department on behalf of the respective occupants.

The upkeep of the heating and lighting installations is a service common to the whole building, and it is not feasible to specifically ear-mark the cost of labour on such general work to the various occupiers. It is therefore suggested that charges for labour—and for materials which cannot be specially ear-marked—shall be apportioned between the occupying departments upon a fixed ratio, based upon the cubic contents of their respective occupations.

In the case of the Meteorological Office this would amount to one-third of the cost for the whole building, which latter is estimated at £150 per annum approximately.

The Board will be glad to hear if you concur in this proposal, which appears to them to be the only practicable procedure to adopt.

Claims for repayment would be made periodically.

I am, &c.,
HENRY WORDLEY.

The Director,
Meteorological Office.

(c) *Nightwatching of office premises.*—The Director reported—that as the result of correspondence in pursuance of Minute 305 (*c*), a night-watchman had been appointed by the Office of Works, in accordance with the following scheme (M.O. 3213), at an annual cost to the Office of about £52, and that notice had accordingly been given to the Metropolitan Police to terminate the arrangement for the custody of the keys, as from Monday, 16th October.

METEOROLOGICAL OFFICE BUILDING.

Night Watching.

The Night-watchman to be employed every night, including Sundays, from 7.15 p.m. to 7.15 a.m.

The Night-watchman will take over the keys of the Meteorological Office portion of the building from their Office keeper at 8.30 p.m., the time at which the Office keeper goes off duty. The Night-watchman will admit the Office cleaners of the Meteorological Office at 6 a.m. daily, Sundays included, and he will hand over the keys to the Office keeper when that official comes on duty at 7.15 in the morning.

The custody of the keys of the Meteorological Office on Sundays during the intervals of the closing of the Meteorological Office about 10 a.m. and its re-opening at 5.45 p.m., will be with the Night-watchman on duty at the Imperial Institute Buildings. This Night-watchman will attend at the Meteorological Office just before 10 a.m. on Sunday morning to receive the keys from the Office keeper. He will patrol the building once or twice between the hours of 10 a.m. and 5.45 p.m., and shortly before the latter hour he will go to the Meteorological Office in order to open it for the staff resuming duty at the time.

The staff generally of the Science Museum, who occupy the top floor, leaves at 5 p.m., although the Director himself may be there so late as 6 o'clock. The Night-watchman, immediately upon going on duty, should patrol the top floor to see if everything is in order. The Night-watchman will receive the keys of this portion of the building from the Messenger.

He will also patrol the Post Office portion of the building, for which purpose he will receive a master key.

(d) *M.O. Press.*—Reported—that the Superintendent of Printing of H.M. Stationery Office had been informed that the Committee did not see their way to make an alteration in the printing office in order to take up the printing of the weekly and monthly reports in 1912, and it was understood that provision would be made for the continuance of the present contract for the weekly and monthly reports for another year, by which time the arrangements with the observatories would have been got into working order and the accommodation for the staff of the Observatories' Branch have been revised. The Superintendent of Demands called, however, to explain that the continuation of the contract for another year was not practicable, owing to the printers having no lithographic press in London except that at the Office. Inquiry was therefore made as to the possibility of moving the large glass case from Bay VI. of the library and accommodating the Observatory Staff of four clerks there, and making the other changes referred to in Minute 305 (*b*). The Director of the Science Museum had expressed his willingness to accommodate the case temporarily in the Science Museum, and it was now therefore proposed to move the glass leaf of the partition in the printing office so as to form a complete glass partition six feet from the Exhibition Road wall of the Office, enclosing two windows and forming a separate room for the artist; to allow Messrs. Wyman & Son to put up a duplicate lithographic press in the south-west part of the printing office; to close the door leading from the office store-room, and thus set apart the whole of the large basement room for the use of the printers. It was further proposed to transform room 15 into a workshop for the Office.

Approved, on the understanding that the hours of occupation of the printing office should be limited to 8 a.m.—6.30 p.m. (except in cases of emergency for Office purposes only), and that suitable regulation should be applied with reference to the printing of work outside the requirements of the Office.

314. *Appointments—Schuster Readership.*—Reported that—the Sub-committee appointed (Minute 258) to select a candidate for appointment as Schuster Reader unanimously recommended Geoffrey Ingram Taylor, B.A., Fellow of Trinity College, Smith's Prizeman, 1910. The appointment was offered to Mr. Taylor in August, and accepted on his behalf by his father, who reported that his son was suffering from enteric fever and would not be able to undertake the duties before the end of the year. Correspondence has taken place with Dr. T. R. Elliott of University College Hospital, who is in charge of the case, and it is recommended that the appointment be for three years from January 1st, 1912, and that if suitable arrangements can be made the University of Cambridge be approved as the university at which the readership may be held.

Eskdale Observatory.—Reported that—in compliance with the request of the Gassiot Committee the Council of the Royal Society had passed the following resolution (M.O. 2,229):—

> That a grant of £450 from the Donation Fund be placed at the disposal of the Gassiot Committee for the purposes of Eskdalemuir observatory with special reference to Seismology; the sum to be paid in two instalments, one during the present financial year, and the other next year, it being understood that the Society is not prepared to make any similar grant in subsequent years.

After correspondence with the members of the Sub-committee for the housing of the Seismographs (the Director, Dr. Schuster, Dr. Glazebrook and Mr. Walker) applications for appointment were invited in accordance with the following circular.

ESKDALEMUIR OBSERVATORY.

The Gassiot Committee are authorised by the Royal Society and the Meteorological Committee to recommend for appointment a duly qualified person as graduate assistant at Eskalemuir Observatory, to take part under the Superintendent in the general work of the Observatory with reference in particular to seismology.

The special qualifications required are an adequate knowledge of mathematics and physics, and skill in the manipulation and adjustment of delicate physical apparatus.

The assistant may occupy quarters in the Assistant's House, rent free, paying at a fixed rate for board, attendance, and personal washing.

The appointment is for two years, at a salary of £200 a year, subject to three month's notice on either side.

Applications may be addressed to the Superintendent, the Observatory, Eskdalemuir, Langholm. August, 1911.

With the provisional sanction of the President of the Royal Society, Mr. L. Southerns, B.A., of Emmanuel College, recommended by Sir J. J. Thomson, was selected and took up his duties on 16th September, 1911, in time to allow the Superintendent to commence his holiday on 30th September. The recommendation was sanctioned by the Gassiot Committeee on 25th October, and the appointment as from 16th September, 1911, on the terms of the circular now requires approval.

Approved.

Mr. H. W. Braby, whose period of probation as voluntary assistant (Minute 293) terminated on 30th September, 1911, has been offered and has accepted appointment as graduate assistant at £60 a year, subject to a month's notice, as from 1st October, 1911. Mr. Braby is to be attached until further order to the Statistical Division, and to be responsible specially for Colonial observations, to prepare them for the press, and to keep himself *au fait* of meterological work in the Dominions and Colonies. The appointment is subject to reconsideration, in view of the Estimates for 1912–13.

Approved.

The Director reported that he had not yet filled the vacancy in the Marine Division occurring in consequence of Mr. Harding's retirement (Minute 309), owing to the uncertainty as to the necessary provision for the statistical work incidental to the proposed transfer of the voluntary stations from the Society to the Office (Minute 308).

315. *Co-operation with the Societies.—Royal Meteorological Society* (Minute 308).—Read—the following correspondence (M.O. 3188, 3188 (2), 3392), also the following report from Mr. Lempfert and Mr. Gold (M.O. 3411) :—

M.O. 3188.

Royal Meteorological Society,
70, Victoria Street, London, S.W.
10th October, 1911.

DEAR SIR,

Dr. DICKSON is, I believe, communicating with you with reference to the stations at which the observers are paid by the Royal Meteorological Society. He has asked me to let you know what are the amounts paid.

They are as follows :—
*Old Street, £5; *Princetown, £4; *Seathwaite, £2 2*s.*; Buxton, £2 2*s.* (for 9 p.m. observations).
The instruments at the stations marked with an asterisk belong to the Society.

Yours faithfully,
WM. MARRIOTT.

Dr. W. N. Shaw, F.R.S.,
Director, Meteorological Office,
South Kensington, S.W.

M.O. 3188 (2).

Royal Meteorological Society,
70, Victoria Street, London, S.W.
26th October, 1911.

DEAR SIR,

WITH reference to my letter of the 10th instant respecting the stations at which the observers are paid by the Royal Meteorological Society, I have to mention that the matter was brought before the Council at their last meeting. They came to the conclusion that the station at Old Street should be discontinued at the end of the present year, and that the payment to the observer at Buxton for the 9 p.m. observations should also cease at the same time.

The Council, however, consider it desirable that the observations at Princetown and Seathwaite should, if possible, be continued, as they are exceptionally situated, Princetown being 1,300 feet above sea-level on Dartmoor, and Seathwaite being in the wettest district in the British Isles.

They trust that you may, therefore, be able to make arrangements for the continuance of the observations at these stations.

Yours faithfully,
WM. MARRIOTT,
Assistant Secretary.

The Director,
Meteorological Office,
South Kensington.

M.O. 3392.

Royal Meteorological Society.
70, Victoria Street, London, S.W.
26th October, 1911.

SIR,

AT the interview which our President, Dr. Dickson, had with you on 26th May, you discussed with him various matters relating to the Society's decision to discontinue the publication of the "Meteorological Record" after the close of the present year, and also to the future work of the Society.

As the outcome of this discussion it was considered that a joint Committee consisting of four members should be appointed, two by the Society and two by the Meteorological Office, to consider the question of what subject should be investigated by the Society in conjunction with the Meteorological Office.

This Joint Committee was duly appointed, and I enclose herewith a copy of their report which was submitted to the Council at their meeting on 18th October.

Should these recommendations of the Joint Committee meet with the approval of the Meteorological Committee and be carried out by the Society, the Council will require from the Meteorological Committee financial assistance. The Joint Committee do not at present know how much time will be occupied in carrying out the work. The Council, however, suggest that the Meteorological Committee should place at the Society's disposal for the year 1912 the sum of £100 in lieu of the contribution hitherto made for copies of schedules of observations.

I am, &c.,

FRANCIS CAMPBELL-BAYARD,
Secretary.

The Director,
Meteorological Office,
South Kensington, S.W.

INTERIM REPORT OF THE JOINT COMMITTEE OF THE ROYAL METEOROLOGICAL SOCIETY AND THE METEOROLOGICAL OFFICE.

[In a Memorandum presented to the Council of the Royal Meteorological Society under date 27th May, 1911, the President of the Society reported that, acting upon the instruction of the General Purposes Committee, he had had an interview with the Director of the Meteorological Office with reference to the co-operation between the Office and the Society in statistical work. It was stated that at the interview it had been agreed that the proposal which offered the best prospects of satisfying the existing conditions was the preparation, after a review of all the materials, of a series of normal values for certain climatological elements for the British Isles; and it was suggested that a Joint Committee, consisting of four members (two representatives of the Meteorological Office and two of the Society) should be appointed to consider the matter in detail, and to prepare a report upon which the Council of the Society could, if it thought fit, base an application to the Meteorological Committee for financial assistance *in lieu* of the contribution hitherto made for copies of schedules of observations.

The Council approved the suggestion embodied in the Memorandum, and at its meeting on 15th June appointed the President and Mr. H. Mellish to represent the Society upon the Joint Committee. Dr. Shaw thereupon appointed Mr. R. G. K. Lempfert and Mr. E. Gold to represent the Meteorological Office.

The Joint Committee was asked to deal with :—

(1) The general scope of the proposed enquiry ;

(2) The nature and extent of the work to be done ;

(3) The cost ;

and to report, if possible, in October].

The Committee reports as follows :—

I.—The Committee is of opinion that the preparation of a set of standard values of meteorological elements for the British Isles offers the best opportunities for co-operative work. They believe that sufficient material is now available for this purpose, and that the work can be successfully undertaken with existing resources.

II.—The Committee think that it is undesirable at the present stage to formulate a complete list of the elements to be considered. It is no doubt desirable to take advantage of the economy in time achieved by a single handling of the sheets or publications containing the fundamental data. The Committee are, however, of opinion that the advantages (1) of producing definite results in a comparatively short time, and (2) of being able to utilize the experience gained in methods of work and form of presentation of the results, outweigh the possible advantages of economy of time, and they therefore recommend that a beginning should be made with the data referring to wind and pressure.

III.—At the request of the Committee, Mr. Marriott undertook the preparation of a list of stations from which observations are available from 1910 backwards, so as to give (*a*) the number of stations available for long period averages, and (*b*) the stations which would afford material for discussing the relation of long-period averages to the true means. This work has been partly executed, and maps have been constructed showing the approximate distribution of stations having records available for 30, 35, 40, 45 and 50 years respectively. The Committe are not in a position to form a final opinion as to what period should be adopted in preparing the standard values, but they recommend provisionally that the 40 years, 1871–1910, should be aimed at. No record of less than 20 years to be used in the first instance, and in the case of pressure not less than 30.

IV.—With regard to pressure, the Committee contemplates the publication of (*a*) monthly mean values arranged in 5-year periods for the period decided upon, (*b*) highest and lowest monthly means, and (*c*) extremes for a limited number of stations. Enquiries will be necessary into corrections for daily range, reduction to mean sea-level, &c., and it is suggested that each of these should be placed in charge of a Fellow of the Society, with assistance from the Society as required. The critical examination of the Records for breaks in continuity will also form an important and probably laborious part of the work.

V.—With regard to wind, the Committee think that wind direction should be dealt with as to eight points of the compass, using the summary for stations of the second order. With regard to wind force, it may be necessary to deal direct with the original records. Special enquiries are likely to arise as to methods of computing and presenting the results, and the application of Lambert's formula.

VI.—The Committee recommend that the Scottish Meteorological Society be consulted with regard to Scottish observations, and that Dr. Mill's views be ascertained as to questions of rainfall.

VII.—The Committee do not think it possible to form an estimate as to the total cost of the work. They suggest that if the services of the Society's staff become available for the undertaking, the necessary preliminary investigations as to distribution of stations and similar matters should be completed, and a beginning made in working up the data for pressure and wind direction. Precise information would then be obtained and a decision arrived at with reference to extending the work to other elements.

H. N. DICKSON.

18th October, 1911.

M.O. 3411.

THE DIRECTOR,

IN accordance with your instructions of 17th June, 1911 (Minute 308), we have attended the meetings of the Joint Committee of the Royal Meteorological Society and of the Office on 6th July, 2nd October, 18th October, and we now beg leave to forward herewith a copy of the report of the Committee. [The report is printed above.]

We have found great difficulty in framing an estimate of the total cost of the work involved in the preparation of the data required for a climatological atlas of the British Isles. If each element is treated with the detail suggested in Hann's "Klimatologie," and actually put into practice in Switzerland and Austria, the work could be made to occupy the Society's present staff for many years. For this reason we have strongly supported the view that it is desirable to treat the elements separately in order to be able to present short reports from time to time, and to keep alive interest in the work.

We are satisfied that the programme beginning with the data for pressure and wind and keeping in view, in the first instance, the preparation of average values for the period 1871–1910, offers a prospect of preparing useful reports on these two elements within a year. The work which the Society's staff has already done for the Joint Committee in the preparation of lists of available data has taken a considerable time, and the ordinary work on the "Meteorological Record" has, in consequence, been delayed. As it has been decided to publish the "Record" up to the end of 1911, the year 1912 will be well advanced before the work of the Atlas can be taken up. Thus if the scheme of the Joint Committee were adopted we might expect the first report to be completed about the middle of 1913.

R. G. K. LEMPFERT.

27th October, 1911. E. GOLD.

It was agreed to inform the Society that application (P.C.D498) had been made to the Stationery Office for copies of the Monthly Weather Report for Fellows of the Society at the cost of paper, printing and stitching, and that it was proposed to make an allowance of £50 a year for two years (Minute 308), subject to the consideration of the estimates, and that a decision could not be arrived at until the meeting in December.

316. *Daily Weather Service—Spurn Head.*—The Director reported—that he had visited Spurn Head, and ascertained that there was no objection on the part of the present lightkeepers to the continuance of the station, but that it was felt that the daily journey from the lighthouse to the inn to carry the 7 a.m. message should be obviated. The alternatives were (1) to make provision for a telephone at Spurn Head, or allow £4 a year for a messenger, and to increase the station by the installation of an anemograph and a sunshine recorder, providing a proper enclosure for the rain-gauge and thermometer screen : (2) to move the station to Easington, and to place it in charge of the coastguard there : (3) to transfer the station to Withernsea, in which case it was probable that the local authority would be the best body to approach respecting a suitable site. Withernsea has the advantage of being accessible by rail, and Easington can be reached by road without difficulty, whereas the journey to Spurn Point involves a drive of four miles over a warren of blown sand. In any case an anemograph and sunshine recorder would be desirable additions for a station on the Spurn peninsula.

It was agreed that it is desirable, if possible, to retain the station at Spurn Head upon the terms proposed.

317. *Gassiot Committee.*—A meeting of the Committee was held on 25th October at which the programme and estimates as set out for the observatories in Minute 318, 319 were approved.

Kew Observatory.—Reported that—a resolution of approval of the draft plans prepared by the Office of Works for the alteration of the buildings at Kew as set out in the following Report was passed at the meeting of 25th October.

REPORT by the SUB-COMMITTEE on PLANS for ALTERATION of KEW OBSERVATORY FORWARDED by the OFFICE of WORKS, 19th SEPTEMBER, 1911.

The plans show the following items :—

First Floor :—

Provides : (*a*) kitchen, larder, living-room, two bedrooms with W.C., bath and cupboards for the caretaker, in lieu of (i) a kitchen and scullery in the basement, (ii) a living-room and two bedrooms (opening one out of the other) in the entresol.

Access is given for the caretaker from the south entrance by continuing the old staircase which leads from the outside lobby of the magnetograph room.

(*b*) A bed-sitting room for a resident observer (at present the Superintendent's room), and a similar room for the Director (at present called the library and used as a clerk's office).

Access to these rooms is given by a staircase leading also from the lobby of the magnetograph room with an opening from the North Hall, the main entrance hall, up to a gallery round the North Hall, and thence by a staircase to the first floor landing. Access is thus obtained to the existing staircase leading to the dome, sun-room and roof, which are not altered.

Main Floor :—

Provides: A superintendent's room, the present computing room. A barometer room as at present on the East side curtailed by taking off a passage behind the great pier, and space for lavatory accommodation at the South end. Two work-rooms on the West side, one of which contains the thermograph and electrograph. (The latter should be removed to one of the outside buildings.)

A gallery is introduced into the North Hall which gives access to the upper tiers of glass cases, and enables the first floor to be reached.

Proper lavatory accommodation is provided in the S.E. corner in lieu of the present lavatory on the main floor and W.C. on the first floor, both of which are in unsuitable positions.

Basement Floor :—

Provides : (i) a photographic room and (ii), two rooms for laboratory work on a level raised 5 feet above the present floor level, giving each a height of about 9 feet, in lieu of (i), the present photographic room with living-room over, and (ii) the present kitchen, and the present scullery with bedrooms over. The floors of the rooms would be above flood level.

(iii) A coal store in lieu of the present sextant room. This and the existing magnetograph room and seismograph room in the South Hall would be protected from flood water by blocking up the doorway between the South Hall and the area and vaults, and coating the lower parts of the walls and the floor with asphalt, &c., thereby raising the floor level about 5 inches.

Area and Vaults :—

A stone staircase is provided to give access to the area which surrounds the observatory in order to replace the access from the North Hall.

The vaults would remain below the level of flood water, but there would be no communication with soil cesspools.

The general ideas which these plans embody are—

i. To provide satisfactory sanitary accommodation.
ii. To protect the interior of the observatory building from flood water, and remove other causes of dry rot.
iii. To provide more suitable accommodation for a caretaker, and to make provision for a resident observer and an occasional worker who might require to carry on observations at night time or out of the ordinary office hours.

The plans meet these requirements : there are a certain number of points which have been considered by the Sub-committee. They will be referred to the Office of Works, and reported upon at the meeting.

13th October, 1911.

Eskdale Observatory.—The following action regarding the accommodation for Seismographs was reported to the meeting of 25th October :—

FOLLOWING on the report of the Sub-committee of 30th June, 1911, and the change in the situation owing to Professor Schuster's present of a seismograph for vertical component in July, I have to report that on 8th September the Superintendent asked for authority to have the pier of the Galizin instrument enlarged to take the new addition, to have a partition erected in the Laboratory to make a chamber for the galvanometer and recording drum, and to build piers in the Laboratory for the Omori and the Wiechert instruments.

Estimates have been obtained for the work, viz., £15 for builder's work, and £13 13*s.* 0*d.* for joiner's work, of which £6 12*s.* 6*d.* (together with the cost of enlarging the pier) is chargeable for the Galizin, and about £5 for the Wiechert.

After consultation with the Treasuary of the Royal Society, in the absence of the members of the Sub-committee, the work has been authorised in accordance with a request of the Superintendent of 27th September.

W. N. SHAW.

16th October, 1911.

It was agreed that the plans for the structural alterations at Kew observatory should be approved, and that the proposal be referred to in the letter to the Treasury accompanying the Estimates for the year.

318. *Programme of Publications for* 1912–13 :—Submitted—the following :—

PROGRAMME OF PUBLICATIONS FOR 1912–13.

Periodical:—Daily Weather Report. 725 to 775.

Meteorological Charts of the Atlantic Ocean. (600 + 150).

Do. do. Indian Ocean. (350 + 200.)

British Meteorological and Magnetic Year-book, 1912.

Part I.—Weekly Weather Report. (375 + 75.)

Quarterly and Annual Appendices. (375 + 75.)

Quinquennial Appendices (if not completed within current year). (600.)

Part II.—Monthly Report Supplement. Monthly and Annual Summaries. (525 + 100 and 25 each of two plates.)

Part III.—Daily Observations at Stations of the First and Second Orders :—

(*a*) Meteorological Section. (250.)

(*b*) Geophysical Section. (375 – 500)

Part IV.—Hourly Readings and other data from First Order Stations :—

(*a*) Meteorological Section. (375 – 500)

(*b*) Geophysical Section. (375 – 500)

Part V.—Climatological Report for the British Empire. (500.)

Observer's Handbook, 1912 Edition. (100.)

Various papers on work completed at the Office or at the Observatories are proposed as appendices to the Geophysical Journal.

Occasional:—Report of the Second Meeting of the Commission for Weather Telegraphy. (250.)

Report of the Second Meeting of the Commission for Maritime Weather Signals. (500.)

Atlas of Tropical Hurricanes. (500 + ?.)

Seasons in the British Isles, with Normals for the four Observatories. (500 + ?.)

Seaman's Handbook of Meteorology. (500.)

Fisherman's Handbook. (500 + 2000.)

Computer's Handbook. (500.)

Tabulator's Handbook. (500.)

Submitted—the following Memorandum by the Marine Superintendent :—

Now that the backs of the Monthly Meteorological Charts of the North Atlantic are otherwise occupied, the "Tidal Streams round the British Isles" insets, given in the past from time to time, on these Charts, have to be altogether omitted. These reproductions, on a reduced scale, of the Admiralty Charts in Atlas form, bearing the same title, were found especially useful to Captains and Officers of the Mercantile Marine.

I beg therefore to suggest that copies of these reproductions, with Cotidal Chart and Explanation, be struck off, and each copy bound as a pocket book, for presentation to those Observers for this Office to whom presentations are made ; or, that the Hydrographer be asked to supply a number of copies of the pocket book edition of "Tidal Streams (British Isles)" which was subsequently published at the Admiralty, and are sold by the Agents for the sale of Admiralty Charts, price 5*s*.

The Hydrographer undertook to consider the question.

Programme of Work for 1912.—Submitted—the following :—

Programme of Work for 1912.

The original plan for the equipment and furnishing of the Office was completed by the delivery in September of the three bronze memorial tablets and the carved monogram for the Hall on the first floor. A good deal has yet to be done in arranging the cases and cataloguing the historical instruments in possession of the Office, of which an inventory has been asked for by the Audit Office. Further accommodation is required in the Library for working papers for the Staff and for the display of publications on sale, photographs, &c. There is room for one case in the ante-room, four under the windows of the library, and two against the west wall.

The Controller of the Stationery Office has made repeated inquiries as to the printing of the lithographic portion of the Weekly Report in the Office press. In order to accommodate the additional machine that is necessary for that purpose, the staff employed upon the observatory records will be moved to one of the bays in the Library, and the Workshop moved to the room under the Laboratory, a more convenient position. This work will be associated in future with the Statistical Division. A large part, if not the whole of it, might be done at Kew Observatory if there were space there for the additional staff.

Upon the representations made to the National Physical Laboratory, new buildings at Teddington have been designed to accommodate the testing staff now at Kew, and for other purposes of the Laboratory. The Treasury has arranged to include a sum in the Estimates for the current and two succeeding years to meet the greater part of the cost. It was anticipated that the work would be commenced at once and the testing removed from Kew in October, 1912, but Dr. Glazebrook's illness may delay the business. The Office of Works has prepared a plan for the rearrangement of the interior of the Kew building which will prevent the encroachment of floods, provide new sanitary arrangements, and reasonable accommodation for residence, and improve the working rooms of the Observatory. If the scheme receives the necessary approval, the operations may be begun in October, 1912, and in the meantime the present unsatisfactory scheme of working the Observatory by means of a mixed staff with divided duties, and using "overtime" as a regular supplement to the routine of the Observatory, continues.

The most important matter in connexion with the programme for Eskdale Observatory is the question of finance. The present income fails to cover the expenditure, and some step must be taken to bring the two into agreement, taking into account the altered circumstances of the Observatory and its relation to international undertakings.

International Meteorology.—The International Meteorological Committee has to give a reply to the urgent request of the International Association for Agriculture for a meeting to be held to consider a scheme initiated by M. Louis Dop for an international organisation of Agricultural Meteorology. This may involve a meeting in Rome in May next. A Meeting of the Commission for Scientific Aeronautics is already arranged for the Whitsun week (May 27—June 1), and it will be necessary to invite the Commission for Weather Telegraphy, which has to deal with the international code, and for Maritime Weather Signals, which has to consider especially a proposal for an international system of night signals, to meet either in London or Paris, or in Switzerland, fitting the meeting in with the other meetings. A meeting of the Solar Radiation Commission is spoken of for January, in Switzerland.

Little has been done in the current year about co-operation with the Colonies. Action still has to be taken on the resolutions agreed upon at Winnipeg in 1909, and on the proposals of the Commission du réseau mondial. If the proposal of Minute 314 to employ a graduate assistant in charge of Colonial observations can be maintained, a definite step in advance will have been secured.

The time has now arrived when it is clear that further progress in forecasting requires that the phenomena of the daily weather should be brought into relation with the meteorology of the globe as a whole. Investigations of the general principles of weather with more limited horizon can only be regarded as "marking time."

The treatment of the meteorological problem on this large scale has been an aspiration among meteorologists for many years and various schemes have been mooted; Sir John Eliot would have created a special department of the Office, supported by subventions from India and other Dominions of the Crown, Professor Hildebrandsson still presses for monthly values from a selection of representative stations, which he regards as centres of action, M. Teisserenc de Bort urges the necessity of having the information while the phenomena are fresh in the minds of the workers; while the Commission for the correlation of solar and terrestrial changes exists for the purpose of collecting monthly information from all parts of the world adequate for the representation of the main features of distribution of pressure, temperature, and rainfall.

The three proposals for collecting and distributing the information for the globe have the approval of the International Meteorological Committee, and the President has been requested to continue his assistance to the Solar Commission on the understanding that the data contributed to the Solar Commission by the various countries will be published in conjunction with solar and magnetic data, and thus rendered available for all. This course is supported as the proper policy for the study of meteorology in itself even by those who would place the correlation of solar and terrestrial changes outside practical politics. It has occasionally been urged that such study should be taken up in place of existing work, but in so far as existing work is not itself a contribution to the general study it serves other purposes which cannot be disregarded. India has for some time carried out the collection of information month by month over a very wide area, and Australia has now asked for a monthly telegram, supported by correspondence, reporting the conditions in Europe. The Office has made a beginning in compiling data for the globe.

The two problems, the mean distribution for the month, and the deviations within the month, are concerned with different aspects of the general problem. They appeal to and employ a different class of workers. The means for the month appeal to statistical workers who have seasonal forecasting ultimately in view; the deviations within the month appeal, on the other hand, to the daily

weather study which requires us to know the structure of the atmosphere and its meaning. Such study must practically be conducted by telegraph, because it appeals to people who work by telegraph, and are constantly passing under the closest scrutiny details which cannot be retained in the memory for many days nor adequately tabulated. We require therefore for this investigation in addition to the current work on daily weather, an organised series of observations of the structure of the air of our own region of the British Isles by means of observations of cirrus clouds and pilot balloons at, say, six observatories or stations, Jersey, Falmouth or Scilly, Valencia, Castle Bay or Lerwick or Balta Sound, Farnborough, and London, and telegraphic reports including information of similar character from, say, Canada (including Bermuda), Ascension, St. Helena, the Cape, and Fiji, as the British contribution. The list of stations from which reports are asked for in the report of the Commission du réseau mondial is as follows :—

Australasia.—Alice Springs, Sydney, Perth, Dunedin.

Canada.—Toronto, Bermuda, Newfoundland, one station in the North, Dawson City.

Sudan and Egypt.—Suez, and station on the Upper Nile.

Great Britain.—London, one or two stations in South Africa, Mauritius, St. Helena, Falkland Islès.

India.—Aden, Zanzibar, one station in Upper Burma.

The report supposes the information for the world to be concentrated in 25 centres, of which 13 are in Europe, three in Asia, three in North America, four in South America, and one in Australasia.

It is not likely that any one centre will be allowed to collect all the information to the exclusion of the others, and the complete exchange between the 25 centres would be unnecessary. The only feasible plan seems to be to divide the world into regions, to compile the information for regions, and subsequently to group it for the world. The regions might be:—

London and Paris.—Western Europe, West Africa, Atlantic.

Berlin.—Central, and Northern and Southern Europe.

St. Petersburg.—Eastern Europe and Northern Asia.

Simla.—Eastern Africa, Southern Asia and the Indian Ocean.

Washington and Toronto.—North America and North-eastern Pacific.

Buenos Aires.—South America.

Melbourne.—Australasia and Southern Pacific.

Tokio.—Japan, China and North-western Pacific.

If the groups into eight regional centres were made, it would be open to each region to effect its own exchanges, and doubtless in Europe all the centres would want the collected information by post if not by telegraph. The new departure would probably lead to developments of the highest importance, but the expense would, in any case, be considerable.

For the investigation of the structure of the air in the British region seven special theodolites have already been obtained : the rest of the work remains to be organized. If it is to be prosecuted it is practically imperative to supplement the staff of the Forecast Division by one or more Graduate Assistants to help the Superintendent in the investigation. On other grounds we should like at once to arrange for a daily service of telegrams from Toronto which would enable us to fill the daily maps of the Atlantic for the Weekly Weather Report.

Periodical Publications.

1. *Monthly Marine Charts.*—No change is contemplated in the general arrangement of these charts.

2. *Daily Weather Report.*—The only modification under consideration is an indication on the land areas of the contours of 1,000 feet and 10,000 feet, which are of practical importance in the daily work of forecasting. Further attention should now be paid to the provisions for the sale of the Report and the public display of information.

3. *Statistical Reports.*—The maps of the Weekly Weather Report should be revised to take in the much greater area to the westward which can now be represented. The proposal is to have a single map for each day similar to that now issued weekly on the Atlantic Charts. Such a map, on the same scale as "yesterday's" charts in the Daily Report would require half a page, and therefore only one map per day could be given unless the space devoted to maps be doubled. The single map can, however, show pressure, temperature, and weather, and the noteworthy changes of pressure and temperature during the successive periods of 24 hours can be indicated in the text.

The Weekly Weather Report, 1911 will complete five years' publication of Sea and Earth temperatures, and it will be advisable to insert the differences from the five year averages from the beginning of 1912.

The Monthly Report will be increased by the addition of the Climatological Stations of the Royal Meteorological Society, the work of which is to be transferred to the Office from the year 1912. The work of the Statistical Division will need some re-organisation in view of the increase of the work. This will be taken up with the moving of the office work upon the observatory records.

The quinquennial appendix to the Weekly Weather Report on the monthly normals for the temperature, sunshine, and rainfall, for the 35 years 1876 to 1910 is due.

The proposal for publishing Climatological Tables for the British Empire is still unrealised.

The revision of Parts III. and IV. of the Year Book is nearly completed, but in consequence of the length of the negotiations, the Geophysical Journal is some months in arrear, and the Gassiot Committee has still to express an opinion upon some of the tables which should be included in "Meteorological Office Observatories—Hourly Values—Geophysical Section."

It is proposed to incorporate in the Geophysical Journal the results of the work upon the upper air hitherto published in the Weekly Weather Report, and also to bring in the mean daily intensity of the vertical component of solar radiation between sunrise and sunset, and the maximum intensity in watts per square centimetre as recorded at South Kensington by the Callendar Radiation Recorder.

4. *Publications de la Commission Internationale pour l'Aerostation Scientifique.*—In co-operation with the Joint Committee of the British Association and the Royal Meteorological Society, Mr. W. H. Dines will continue to direct the work at Pyrton Hill, and to assist other centres of investigation in connection with the International Commission. A new upper air station for sounding balloons has been established, through the intermediary of the Superintendent of Statistics, at Mungret College, near Limerick, in charge of Rev. W. O'Leary, S.J. The expenses are met out of a grant by the British Association. It is a matter for regret that the investigation of the air over the ocean is at present left almost exclusively to the German Navy and the Italian Navy, but so far there does not appear to be any means of enabling this country to take part in the work.

The arrangements with the War Office for the erection of buildings for the branch of the Office at South Farnborough, which would take part in the investigation of the upper air are proceeding. It is expected that the Office will be ready for occupation by the first of April next. The grant for the expenses of the Meteorological part of this establishment comes through the Advisory Committee for Aeronautics.

Occasional Publications, Discussions, and other Researches.

It is proposed as far as possible to publish the results of discussions and special researches in the same form as the Geophysical Journal and to page them consecutively as an annual appendix or supplement to the Geophysical Journal, with the title Geophysical Journal—Memoirs, 1911, &c. In the case of publications which appear elsewhere, or which are not suitable for publication in the quarto form, an extract or note would be published in the Journal so as to complete the representation of the work of the year. Notes of this kind appear now in the Annual Report. The handbooks and textbooks would appear as octavo publications.

1. Marine Division.—(vii.) *Synchronous Circumpolar Charts* from 30° S. southward. The Daily Charts for the period October, 1901, to March, 1904, inclusive, are completed. The preparation of Monthly Means of Pressure, Air Temperature and Wind, and Normals of Pressure and Air Temperature will not be finished before the Spring of 1912.

xxxi. The *Seaman's Handbook* is nearly ready.

ii. The synopsis of *Tropical Revolving Storms*, with accompanying Charts, will be commenced when the Seaman's Handbook has been prepared. It should be completed before the close of 1912, much of the matter being ready.

xxxv. *Meteorology of the China Sea and North Pacific.*—In connexion with the request of the Hydrographer for the data as to currents in the China Sea, the compilation of the data for the China Sea and North Pacific will form the chief subject of discussion in the division.

iii. *Meteorology of the South Pacific Ocean* must wait until the work in the North Pacific (xxxv) is out of hand.

Meteorological Tables, requisitioned by the Hydrographer for China Sea Directory, Vol. III.; Eastern Archipelago Pilot, Part II.; Baltic Pilot, Part II., will occupy the time of at least one member of the Staff until August, 1912, from the commencement of the year when Tables, now in hand, will be completed.

2. Forecast Division.—0·2. A new edition of the Instructions for Telegraphic Observers is required.

xxxvii. *Monograph on Coast and Sea fogs.*—An inquiry into the meteorological and physical conditions under which coast or sea fogs occur is urgently required. The Admiralty request that

special attention be paid to the elements fog and wind in the forecasts which are distributed each evening by wireless telegraphy. At present the forecast staff have little to guide them in framing forecasts of fog or mist.

xxxviii. *Monograph on Snow in the British Isles.*—An inquiry into the conditions under which snow occurs is also desirable in view of the frequent inquiries addressed to the Office by Highway authorities.

xxxix. *Wind Tables for the British Isles.*—It is proposed to modify and amplify the form in which statistics of wind frequency are prepared from the anemogram tabulations, so as to take account of direction as well as of velocity. No change will be made in the form in which the results are published in Appendix III. of the Weekly Weather Report, but the results will be set out in such a way that an extended report can be prepared from them in due course, say after five years' records have been discussed.

The inquiry into the relation between the gradient wind and the observed wind requires to be continued. Gradient winds have been tabulated for four stations for a period of two years. The discussion of these results is in progress.

The remaining item in this division is viii. *Forecast District Inquiry*, with which no progress has been made for some time. A specimen table is given in "Forecasting Weather," and the method of dealing with material collected will be considered after the book is published.

3. Statistical Division.—x. *The Seasons in the British Isles since* 1878. The work for this is still in progress. The tables for the first five districts have been completed and summarized up to the end of 1910, but it is desirable to form the standard deviations for each week of the year for at least one district, and this has already been done for one element, temperature. Publication of the values for the four quarters and for the whole year of the rainfall, temperature, and sunshine data for the different districts for each year from 1878 to 1910 inclusive (sunshine 1881), together with plates giving the diagrams already prepared, and tables showing the standard and proportional deviations for the different elements, and the regression equations giving the proportional departure of any element in one quarter in terms of the proportional departures of the three elements in the preceding quarter. The publication will be combined with xv. *Summaries of Hourly Readings at the four observatories*, in a single publication.

xi. *The Observers' Handbook*, 1912 *Edition.*

xii. *The Sequence of Weather Changes at the Winter Quarters of the "Discovery."*

xiv. Questions in connection with the British Association Committee on *Climate and Health.* It has been proposed to transfer this work from the British Association to the Balneological and Climatological Society. No definite programme has been put forward.

4. Instruments Division.—The supply of instruments to the Dominions and Colonies occupies nearly the whole of the time of the staff of the division.

With the removal of the workshop to the second floor the work of the instruments division will be much more compact. The superintendent's room, the clerk's room, and workshop will form a series of three consecutive rooms on the North side of the corridor, and the laboratory will be over the workshop. This will facilitate regular experimental work. A subject which should be undertaken is the regular daily investigation, physical and chemical, of the air of London. This could be done with a dust counter or other corresponding means, and a regular test for acids, &c. In present circumstances we have no facilities for the expert superintendence of such an investigation, but if in the current year circumstances should permit, the investigation ought to be undertaken.

xl. The question of a pen-mercury-barograph for use at the observatories in place of the photographic record has been under discussion for some time. Mr. W. H. Dines has revised the arrangement of the instrument made to his designs and lent to the Cambridge Observatory, and it is now in the Laboratory. A new one is to be made at Pyrton Hill.

The other items which have yet to be dealt with are—

xvii. *Anemometric comparisons*; xxxii. *Redetermination of Anemometric constants*; xviii. *Microbarograph traces*; xxi. *Barograph with* 10*-fold magnification* for the vestibule; xxii. *Rate of Rainfall recorder.* Mr. W. H. Dines proposes to take this subject in hand; xxvi. *Tables for the computation of humidity from the readings of the dry and wet bulb*; xxix. *Notes on Instruments.* These last two should be done in conjunction with the central observatory.

The work of this division will be rearranged by the transfer to the Statistical Division of the clerical work of the preparation of the observatory tabulations for the press. In future the work of the Instruments Division will be confined to examining the curves to see that the instruments are in proper working order. The Instruments Division will have charge of the instruments at the Office and at the auxiliary observatories and stations, and of the workshop and laboratory.

The Callendar Radiation Recorder is now working satisfactorily and giving records which require discussion in relation to the data for solar radiation published in the Geophysical Journal.

The new pressure-tube anemograph, combining records of direction and velocity, as worked out at Pyrton Hill, is now in the manufacturer's hands. In the course of the year instruments of this new type should be erected at South Farnborough, Spurn Head, Gorleston, and Pendennis, and either Castle Bay or Malin Head. The bridled anemometer is still at the Office.

5. OTHER WORK.—xxviii. *The Computer's Handbook.* A first draft of the text has been made and typewritten, and a first edition ought to be ready within the year.

xxxiii. The course of *Lectures* in the University of London, on *The Climates of the British Possesions*, Lent Term, 1911, has to be prepared for publication by Messrs. Macmillan & Co. The course of lectures for 1912 on *The Meteorology of the Globe* has been promised to the Cambridge University Press.

PROGRAMME OF WORK AT THE OBSERVATORIES FOR THE YEAR 1912.

KEW OBSERVATORY.

Plans have been prepared by H.M. Office of Works for remodelling the internal arrangement of the building in order to protect the Observatory from disturbance on account of floods which was the subject of serious complaint last year, to provide improved sanitary accommodation and appropriate accommodation for a caretaker, resident observer, and an occasional worker. Temporary relief from the most pressing disabilities in connection with the drainage was obtained by alterations carried out in January with the understanding that the question of re-arrangement would be taken up as soon as the National Physical Laboratory moved the work of testing instruments to Teddington. Provision has been made by H.M. Treasury in the estimates for 1911–12 and subsequent years for the erection of the necessary buildings at Teddington, and it is expected that the transfer will take place in time for alterations at the Observatory to be commenced in October, 1912.

The proposals affect all the rooms of the Observatory, but especially the basement. It will, therefore, be necessary to provide for the temporary removal of the magnetic recorders, the barograph and the seismograph to out-buildings. Indeed, practically the whole work of the Observatory will have to be carried on for the time being in the Clinical House, the Workshop (now a packing room), and the Experimental House during at least a part of the six months from October, 1912.

As part of the precautions against dry rot, which has been very troublesome in recent years, it is intended that the electrograph shall be permanently removed from the main building to the "Workshop," which would be devoted specially to work on atmospheric electricity, so that opportunity would be taken of the occasion of the temporary removal to work out the details of the electrical installation.

Opportunity would also be taken for the examination and repair of the structure on the roof, on which anemometers are now erected from time to time, and for some action with regard to the dome, which contains a photoheliograph belonging to the Royal Society that has remained unused since 1895.

The work of the Observatory will, therefore, necessarily be liable to interruption during the year, but it has been set out as follows, under the headings "*Periodical Publications*" and "*Occasional Publications, Discussions and Experimental Researches.*" The ground for this mode of grouping is that all the work of the Observatory is directed with a view sooner or later to scientific publications, and it is desirable to keep that object steadily in mind. In the case of the "Occasional Publications" the prefix of a number indicates that the Meteorological Committee is prepared to authorise the publication.

When the alteration of the building is completed attention will be given to laying out the grounds with a view to special observations of humidity, evaporation and the electrical condition of the air in relation to growing plants.

Periodical Publications.

1. *British Meteorological and Magnetic Year Book. Geophysical Journal and Hourly Readings.* — Photographic registration of pressure, dry and wet bulb temperatures, mechanical registration of rainfall, sunshine, wind direction and velocity as in past years, with the exception that the mechanism of the Robinson anemograph will be altered so as to bring the record into harmony with the factor 2·2 instead of 3 for which the forms are ruled. Tabulation week by week of the records for each hour.

Solar radiation by Ångström's pyrheliometer between 11 h. and 13 h., or at some other hour when practicable.

Photographic registration of Electrical potential with the Kelvin water-dropper. Systematic observations of potential-gradient in the open for the reduction of the curve readings. Tabulation of the curve readings at 3 h., 9 h., 15 h., 21 h., for each day; tabulation of the curves for each hour of ten selected quiet days in each month.

Daily observations (weather permitting), between 14 h. and 16 h. of the number and mobility of the ions with the Ebert apparatus and of the air-earth current with the Wilson apparatus.

Photographic registration of magnetic declination and of horizontal and vertical magnetic force. Control observations of absolute magnetic force, declination and dip about once a week.

Provisional tabulation month by month of the daily maximum and minimum and range of the horizontal force and declination. Final tabulation for each hour of the five quiet days of each month of the year 1911 selected by the International Commission.

The preparation of meteorological data for the Press is at present carried out partly at the Office and partly at the Observatory. The assignment of a characteristic of the electrical and magnetic

character of each day and the preparation of the electrical and magnetic data for the Press will remain part of the work of the Observatory. The preparation of tables of diurnal magnetic inequality, and other tables for the Annual Summary for 1911 has to be arranged in conjunction with corresponding work for Eskdale Observatory. The preparation for the Press of the magnetic results for Falmouth and Valencia will be continued as in previous years.

Data for Parts I. and II. of the Year Book (Weekly and Monthly Reports) will be reported weekly or monthly as in past years. The sheets of Dines pressure tube anemograph will be sent to the Office week by week for tabulation.

ii. *Daily Weather Report.*—Eye readings of pressure, temperature, etc., at 7 h., 13 h., 18 h., and the daily tabulation of sunshine by the Observatory staff, with the assistance of the caretaker, under the special arrangement of December, 1910, will be continued and reported to the Office by telephone.

iii. *Publications de la Commission Internationale pour l'Aérostation scientifique.*—Observations of the motion of clouds on the first Thursday of each month and for three consecutive days or a week in certain months : these will be reported to the Office for transmission to Strasburg.

iv. *Magnetic Commission of the International Meteorological Committee: Circular.*—Return of the magnetic character of each day to be sent to De Bilt.

v. *Report of the Royal Cornwall Polytechnic Society.*—The preparation of the Falmouth magnetic tables for the report has already been referred to.

vi. *British Association: Committee on Seismological Investigations.*—Continuous photographic registration of the Milne seismograph. A half-yearly table of tremors is to be sent to the Secretary (Professor Milne).

Occasional Publications: Discussions and Experimental Researches.

CO 6. *A Summary of the Observations of Fog* made at the Observatory during the past 15 years has already been completed and reported to the Office. A Paper on the subject is in preparation. The observations will be continued.

CO 1. *Kew Pattern Barometers.*—The immediate work of comparison of the readings of two barometers differing in the degree of constriction is complete and shows phenomena not accounted for by Stokes's theory. A comparison of readings of the two barometers on board ship has been asked for from the Office, and the subject will be proceeded with when that comparison has been obtained.

CO 2, 3. *Travelling Barometers. Comparison of Screens.*—These investigations have not yet been commenced. The Callendar recorder for the latter is now ready and will be set up before the close of the current year.

CO. 4. *Comparison of the Electrical State of the Atmosphere at Kew, Eskdalemuir and South Kensington.*—As the result of an understanding with the Master and Fellows of Gonville and Caius College, Cambridge, the Meteorological Committee have appointed Mr. Gordon Dobson, B.A., research student of the College, as Graduate-Assistant, with special reference to research in atmospheric electricity, for the year from October 1, 1911. Mr. Dobson has been directed to make a report upon a comparison of the electrical state of the atmosphere at Kew, Eskdalemuir and South Kensington, using in the first instance the data published in the "Geophysical Journal," or in the previous reports of the Observatories, amplifying the observations by special experiments, etc., as may be required. Mr. Dobson commenced work at Kew on October 1, 1911, but will spend part of his time at other Observatories, etc., as may be necessary for the purpose of his investigation. While at the Observatories he will take part in their regular work.

CO 5. *Discussion of the Work of the Observatory in the Ten Years*, 1901–1910.—The preparation of a summary of the work of the Observatory during the past ten years was suggested at one of the meetings of the Gassiot Committee. Such summaries, with discussion, should form a regular feature of the operations of the institution. The discussion must necessarily depend upon a comparison of the results with those obtained at other times or at other Observatories, so that each summary would deal with other matter than that accumulated locally within the ten years, but except for the form of certain tables which would naturally be a recurring feature in a series of summaries for successive periods, the scheme and details of the discussion would be left mainly to the discretion of the official in charge of the work.

CO 7. *Discussion of the Horizontal and Vertical Force Curves for* 1890–1900.—Dr. Chree remarks that "in consequence of the increased demands made by administrative work and the preparation of periodical publications upon his own time and that of the staff in 1911 the tabulation and discussion of magnetic data from 1890 to 1900 has made much less progress than he had hoped."

CO 8. *Record of the Water Level in the Ground.*—During the alteration of the building a well and float will be arranged to record continuously the water level in the ground beneath the Observatory.

Quick Run Magnetic Records for two hours each will be taken in connection with the British Antarctic Expedition (Captain Scott), and the Australasian Antarctic Expedition (Dr. Mawson), on the following 18 days :—

January...	22—18 h.—20 h.	June ...	13—17 h.—19 h.
„ ...	26— „ — „	July ...	16— 8 h.—10 h.
March ...	19— 8 h.—10 h.	„ ...	18—17 h.—19 h.
„ ...	21—17 h.—19 h.	August ...	13— 8 h.—10 h.
April ...	16— 8 h.—10 h.	„ ...	15—17 h.—19 h.
„ ...	18—17 h.—19 h.	September	10— 8 h.—10 h.
May ...	14— 8 h.—10 h.	„	12—17 h.—19 h.
„ ...	16—17 h.—19 h.	October ...	8— 8 h.—10 h.
June ...	11— 8 h.—10 h.	„ ...	10—17 h.—19 h.

CO 9. The question of the intercomparison of the British standard barometers and standard magnetic instruments with those of other countries has been the subject of resolutions at international meetings and the programme has been partly carried out. This country has hitherto taken no active steps in the matter. It is doubtful whether anything will be possible this year, but it is obvious that a comparison before the dismounting necessary for the alterations would be most desirable, and it will, therefore, be carried out, if possible.

ESKDALE OBSERVATORY.

Mr. L. Southerns, B.A., of Emmanuel College, Cambridge, who was selected by the Sub-Committee for appointment as Special Assistant to take part in the general work of the Observatory, with reference in particular to the seismological work of the ensuing two years, reported himself for duty at the Observatory on September 16, 1911.

No structural alterations to the existing buildings are contemplated in the course of the year, but the question for the housing of the seismographs in a separate building has been suggested by the Sub-Committee on that subject. It may be necessary to reconsider the provision for housing the assistants. The provision of a motor car for the use of the Observatory is a matter of pressing importance. The financial position of the Observatory must be dealt with before October, 1913. The expenses already exceed the income, the deficit for the nine months ended March 31, 1911, (including cost of works executed by H.M. Office of Works and charged to the Observatory), is £100. In the current year additional expense has been incurred for deputies for the assistants during holidays and for a Special Assistant at £200 per annum, whose salary has been provided for two years only by the Royal Society.

The Superintendent writes :—"It is important to proceed with planting of trees to secure some shelter for the buildings in the future. The experiment of transplanting moderate-sized spruce trees has been only partially successful. I have consulted Mr. J. H. Milne-Home, Chamberlain to the Duke of Buccleuch, and he thinks we must begin with comparatively small trees. He presented us this spring with 100 trees, and they have been most successful. I have accordingly arranged with Mr. Milne-Home to get 1,000 young trees from him next spring in order to start a plantation right along the south side of the grounds."

Periodical Publications.

i. *British Meteorological and Magnetic Year Book.*—Photographic registration of the three components, N, W and V, of terrestrial magnetism by the Adie magnetographs ; control observations of absolute magnetic force, declination and dip about once a week. Provisional tabulation month by month of the records for each hour and of the maximum and minimum for the day. The question whether the "reading at the exact hour" should be continued as the hour of tabulation, is reopened with the close of the year 1911. The Superintendent proposes to tabulate instead the *mean ordinate* estimated from ½-hour before to ½-hour after the hour. The question between the two alternatives has been under consideration by the International Meteorological Committee (Innsbruck, 1905), and has been referred once more to the Magnetic Commission.

The Superintendent hopes to provide for double tabulation of the curves so as to avoid chance errors of reading. He hopes also to devote some time to the examination of special phenomena in the records. The results of such an examination could be included in the Year Book with the annual summary.

Photographic registration of pressure, dry and wet bulb temperature, mechanical registration of rain, sunshine and wind velocity (pressure tube). Control observations of pressure, temperature and cloud at 9 h., 12 h., 21 h., rain at 9 h. The Weather Journal will be continued. Day by day tabulation of the records for each hour.

Solar radiation by Ångström's pyrheliometer between 11 h. and 13 h. (or at some hour more suitable for the locality), when practicable.

The exposure of the rain gauges is still a subject of investigation. In the course of the year it is intended to replace the head of the pressure tube recorder by one of the new design which will record both direction and velocity.

Photographic registration of electrical potential with the water-dropper and a Dolezalek electrometer. Occasional observations of potential-gradient in the open for the reduction of the curve readings. Day by day tabulation of the records for each hour. The Superintendent hopes to resume his experiments as to the best mode of observing the potential-gradient in the open.

Daily observations (weather permitting) between 14 h. and 16 h. of the number and mobility of the ions with the Ebert apparatus.

The material for the "Geophysical Journal" and the "Hourly Readings, Meteorological Section," will be reported to the Office month by month.

The preparation of the Tables for "Hourly Readings, Geophysical Section," including the Annual Summary, &c., will be arranged in conjunction with Kew and the Office.

Seismology.—The apparatus at the Observatory for recording the three components of the seismic disturbance upon the Galizin principle has been completed by the acceptance of the gift by Professor Schuster, of a Galizin apparatus for recording vertical motion. Provision is being made for the enlargement of the pier which used to hold the Wiechert apparatus* to take the new

* By a misunderstanding the pier to be enlarged was wrongly described in the report to the Gassiot Committee (p. 118, minute 317).

instrument for the vertical component, but there is not room in the seismograph room for the recording drum and galvanometer. It is therefore proposed to set up a partition in the laboratory for that purpose. It is also proposed to make piers in the laboratory for the erection of the Omori and Wiechert instruments, both of which use smoked paper and can therefore be set where the motion of the recording parts can be seen. The Observatory will thus have in the seismograph room the complete Galizin apparatus and the twin Milne apparatus which record photographically, and in the laboratory the Wiechert and the Omori instruments which record on smoked paper.

The Superintendent writes :—" During 1911 I have only been able to make a partial analysis of the Galizin seismograms, but in 1912 I shall aim at a complete analysis of the seismograms, and I anticipate that this will involve some joint action with Prince Galizin in comparing our results with those obtained at Pulkowa. As soon as the four types of horizontal seismograph have been got into working order a systematic comparison of results will be carried on."

No proper provision has yet been made for the periodical publication of the results of the seismological investigation. The seismological table of the Geophysical Journal uses a notation which was not accepted by the meeting at Manchester of the International Association for Seismology in July, and another form was approved then which must be followed for the International Exchange, and the Table in the " Geophysical Journal " should follow the same model. The usual contribution will be made to the Committee of the British Association. It would be advisable for the Committee to make a suggestion as to the best way of making public the year's seismological results.

ii. *Occasional Publications—Discussions and Experimental Researches.*

EO 1. The experiments with bifilar quartz suspensions and damping for magnetographs will be continued, and steps taken as soon as possible to have a second set of magnetic recorders set up in a permanent way.

EO 2. An instrument for recording the vertical component with bifilar quartz suspension designed by the Superintendent has been made by W. G. Pye & Co. Its action will be examined.

The question of the effect of the variation of temperature upon the recording instruments will come up for consideration with one or both of the preceding subjects of investigation.

EO 3. A new Zn-Cu voltmeter has been made by W. G. Pye & Co. It will be tested and run along with the Dolezalek recorder.

The apparatus for EO 2 and EO 3 has been provided out of grants from the Government Grant Committee. The unexpended portion of a grant for seismology is also available for the work in connection with the Wiechert seismograph.

EO 4. *Exposure of Rain-gauges in Windy Situations.*—By the end of the year the observations upon different forms of protection of the rain-gauges against the effect of strong winds, which have been gradually accumulating since the Observatory was opened, will probably be sufficient for a definite conclusion to be formed as to the proper method of exposure of rain-gauges at windy stations and may form the subject of a short paper.

EO 5. *Continuous Registration of the Electrical Conductivity of the Air and of the Rate of Production of Ions.*—The Superintendent writes:—" The question whether the amount of time spent on the Ebert apparatus is justified by the results will have to be considered. For special points, however, the apparatus is distinctly valuable. In this connection we hope to set up and examine an apparatus for continuous registration of the electrical air conductivity and of the rate of production of ions. It is essentially an inverted electrograph."

Valencia Observatory.

Periodical Publications.

i. *British Meteorological and Magnetic Year Book.*—The work of a Meteorological Station of the first order will be continued (the anemograph will be adjusted to factor 2·2), and the tabulations, &c., reported to the Office, week by week, as in the past. The observations of absolute magnetic force twice a month, are to be continued and reported to Kew, month by month, for the " Geophysical Journal."

No special investigations are on foot. A sum has been placed in the estimate for a theodolite, with the intention of arranging for a short period of observation with pilot balloons, probably in connection with the visit of the Inspector, which may be timed to coincide with the week of international investigation of the upper air.

ii. *Daily Weather Report.*—Daily observations of pressure, &c., at 7 h., 13 h., 18 h., 21 h., and the daily tabulations of sunshine, reported to the Office by telephone to Cahirciveen Post Office at the hours of observation, will be continued.

Publications.—Submitted—the following :—

RETURN of PUBLICATIONS issued by the METEOROLOGICAL COMMITTEE during the financial year 1910–11, showing in each case the cost of PRINTING, &c., and the AMOUNTS RECOVERED by SALES during the year.

1909–10. Cost of Printing and Paper.	1909–10. Sales through Stationery Office Agents.	Publication.	1910–11. Cost of Printing and Paper.	1910–11. Sales through Stationery Office Agents.
£ s. d.	£ s. d.		£ s. d.	£ s. d.
473 9 10	—	Daily Weather Report	495 15 4	—
457 4 5	39 3 0	Weekly Weather Report (including Monthly Summaries).	442 19 2	52 15 0
64 16 10	—	Weekly Weather Report, Appendices to.	50 5 7	—
141 4 9	9 16 4	Monthly Pilot Charts (Indian Ocean)	238 12 1	7 3 0
206 16 3	13 13 4	„ „ „ (North Atlantic, and Mediterranean).	236 3 9	13 17 8
171 11 9	—	Hourly Readings	162 5 5	—
67 3 8*	7 18 8	Annual Report, 1908-9	—	—
—	—	„ „ 1909-10 (and Appendices).	52 14 1†	12 11 6
162 1 0	2 5 0	Stations of the Second Order, 1905	—	—
120 10 5	2 6 8	„ „ „ 1906	—	—
—	—	„ „ „ 1907	125 0 6	—
111 12 1	—	„ „ „ 1909	—	—
—	—	„ „ „ 1910	113 3 7	2 18 4
89 16 9	17 19 8	Barometer Manual for the use of Seamen.	—	—
38 9 2	1 13 4	Free Atmosphere in the region of the British Isles.	—	—
—	—	Trade Winds of the Atlantic ...	48 18 10	1 2 0
57 19 2	20 4 0	Observer's Handbook	23 10 7	—
2 5 10	—	Wireless Telegrams from Liners—Report.	—	—
37 11 2	—	Meteorological Log	37 8 1	—
—	—	Outline Map of the World	17 9 0	—
31 9 5	—	Minutes of Proceedings of Meteorological Committee.	39 13 10	—
17 16 7	—	International Meteorological Committee—Reports.	—	—
18 14 1	2 10 10	Codex of Resolutions adopted at International Meetings.	—	—
—	—	Maritime Weather Signals Commission, Report of Proceedings.	1 6 3	—
2,270 13 2‡	117 10 10		2,085 6 1§	90 7 6
	11 3 8	Miscellaneous Sales of earlier Publications.		33 19 4
	54 16 0	Sales by Meteorological Office ...		47 4 1
	183 10 6			171 10 11

* This amount includes the sum of £25 2*s.*, the cost of copies supplied to the Meteorological Office on repayment.
† This amount includes the sum of £32 9*s.* 8*d.*, the cost of copies supplied to the Meteorological Office on repayment.
‡ This amount includes the sum of £1,819, the cost of the Official Publications supplied to the Meteorological Office for Departmental use, &c., during 1909–10.
§ This amount includes the sum of £1,744, the cost of the Official Publications supplied to the Meteorological Office for Departmental use, &c., during 1910–11.

STATEMENT showing the EXPENDITURE by H.M. STATIONERY OFFICE for PRINTING, STATIONERY, &C., for the METEOROLOGICAL OFFICE.

—	Printing.	Paper.	Binding.	Books.	Stores.	Total.
	£	£	£	£	£	£
1910–11	1,640*	341*	169*	7	46	2,203*
1909–10	2,017*	315*	139*	13	22	2,506*

* These amounts include the cost of the copies of Official Publications supplied for Departmental purposes.

319. *Estimates for* 1912–13.—Reported—M.O. 3193 from the Treasury, asking for the usual estimate of expenses of the Meteorological Office for 1912–13 to be sent in not later than 1st December.

Submitted—the following first draft of estimates for the year 1912–13 :—

METEOROLOGICAL OFFICE. Estimates for the Year 1912–13.

Heads of Service.	Proposed for 1912–13.	Voted for 1911–12.	1912–13.	
			Increase.	Decrease.
	£	£	£	£
Director	1,000	1,000	—	—
Office salaries	8,676	8,279	397	—
Observatories	3,881	3,112	769	—
Office expenses :				
Rent, fuel and lighting	730	765	—	35
Repairs, furniture, and incidental expenses	405	360	45	—
Postage	650	600	50	—
Telegrams	2,475	2,425	50	—
Travelling expenses	340	320	20	—
Superannuation allowances (operative) ...	1,383	1,208	175	—
„ fund	—	328	—	328
Cost of instruments	2,310	2,300	10	—
Allowances for auxiliary observatories, observers, &c.	2,731	2,760	—	29
Totals	24,581	23,457	1,516	392
Appropriations in aid :				
Observatories	2,428	1,862	566	—
Departmental expenses refunded	435	395	40	—
Incidental expenses refunded	495	550	—	55
Telegraph expenses refunded	560	610	—	50
Cost of instruments refunded (Navy) ...	510	510	—	—
„ „ „ (other sources)	1,500	1,490	10	—
Superannuation	800	780	20	—
Lectures and experiments	400	410	—	10
Parliamentary Grant	16,850	16,850	—	—
Totals	23,978	23,457	636	115

Submitted the following :—

METEOROLOGICAL OFFICE.

STATEMENT of CHARGES upon the GRANT for 1912–13 REQUIRED for WORK SANCTIONED in the CURRENT YEAR.
(Normal Increases of Salaries are included.)

—	Administration.		Lectures and Experiments.		Inspections.		I.—Marine.		II.—Forecasts and Storm Warnings.		III.—Statistics, Library and Climatology.		IV.—Instruments and Observatories.		No.	Total.	
	£	£	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Office Salaries.																	
Director £1,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,000
Superintendents and Secretary	...	...	...	(1) 288	...	...	...	(1) 450	...	(1) 413	...	(1) 388	...	(1) 350	5	1,889	...
Graduates Assistant	...	...	...	...	...	...	...	...	...	...	...	(1) 60	...	(1) 60	2	120	...
Clerks :—																	
Cashier and other Staff Clerks	...	(4) 670	...	...	...	...	...	(5) 880	...	(8) 1,628	...	(6) 965	...	(4) 655	27	4,798	...
Clerks Assistant	...	...	...	...	...	...	...	...	...	...	...	(1) 98	...	(1) 82	2	180	...
Supernumerary Clerks	...	...	...	...	...	...	...	...	...	(1) 63	...	(1) 83	...	...	2	146	...
Probationers and Boy Clerks	...	(1) 40	...	...	...	...	...	(2) 83	...	...	...	...	...	(3) 140	6	263	...
Female Clerks	...	(1) 100	...	(1) 100	...	...	...	(3) 295	...	...	...	...	...	...	5	495	...
Office Keepers, including Sunday Duty	...	(2) 200	...	...	...	...	...	...	...	...	...	...	...	...	2	200	...
Messengers	...	(5) 268	...	...	...	...	...	...	...	...	...	...	...	...	5	268	...
Observers and Laboratory Attendant	...	...	...	(1) 35	...	...	...	...	...	...	...	...	...	...	1	35	...
Cleaners	...	(4) 122	...	...	...	...	...	...	...	...	...	...	...	...	4	122	...
Lift Attendant	...	(1) 50	...	...	...	...	...	...	...	...	...	...	...	...	1	50	...
Night Watchman	...	(1) 30	...	...	...	...	...	...	...	...	...	...	...	...	1	30	...
Allowance for Revision 80	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	80	...
																	8,676
Office Expenses.																	
Rent, Fuel, and Lighting :—																	
Rent, including Heating and Lighting	680	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attendance on Heating and Lighting Apparatus (H.M.O.W.)	... 50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		730	...	...	...	...	...	...	...	...	...	...	...	...	...	730	...
Repairs and Furniture	...	100	...	...	...	...	...	...	...	...	...	...	...	...	...	100	...
Incidental Expenses (Exclusive of Postage) :—																	
Carriage of Parcels	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Books and Printing (inclusive of S.O.P.)	110	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Office-Keeper Contingencies	80	...	...	40	...	...	...	...	...	...	...	...	...	...	...	40	...
Telephones, &c.	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		265	...	...	...	...	...	...	...	...	...	...	...	...	...	265	...
																	1,135
Postage and Telegrams.																	
Postage	...	300	...	...	...	...	...	...	...	350	...	...	...	...	...	650	...
Telegrams from Inland Stations and H.M. Ships	...	...	...	...	...	...	...	...	550	...	...	...	...	...	...	...	...
„ from Mercantile Marine	...	...	...	...	...	...	...	...	350	...	...	...	...	...	...	...	...
„ from Abroad	...	...	...	...	...	...	...	...	390	...	...	...	...	...	...	...	...
„ sent Abroad	...	...	...	...	...	...	...	...	500	...	...	...	...	...	...	...	...
„ Storm Warnings	...	...	...	...	...	...	...	...	300	...	...	...	...	...	...	...	...
„ Hay Harvest Forecasts	...	...	...	...	...	...	...	...	85	...	...	...	...	...	...	...	...
„ Sundries, Forecasts, &c.	...	...	...	...	...	...	...	...	90	...	...	...	...	...	...	...	...
Allowances to Clerks	...	...	...	...	...	...	...	...	135	...	...	...	...	...	...	...	...
Post Office Charges for Special Attendances at South Kensington	...	...	...	...	...	...	...	...	75	...	...	...	...	...	...	...	...
										2,475	...	...	...	...	...	2,475	...
																	3,125
Carried forward £1,080	...	2,875	...	463	...	...	...	1,708	...	4,929	...	1,594	...	1,287	63	...	13,936

	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Brought forward £1,080	...	2,875	...	463	...	...	...	1,708	...	4,929	...	1,594	...	1,287	63	...	13,936
Travelling Expenses.																		
Committee, &c.	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Representatives at International Meetings	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Inspectors, M.O.	...	...	...	...	200	...	...	...	...	...	...	...	...	...	...	...	...	...
„ Scottish	...	...	...	...	50	...	...	...	...	...	...	...	...	...	...	...	...	340
		90	...	...		250	...	...	...	...	...	...	...	...	...	...		
Superannuation.																		
Mr. Scott	400	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mr. R. H. Curtis	...	...	...	...	...	...	...	...	...	...	...	...	{ 25	...	...	...	...	...
Annuities	150	...	...	...	...	...	300	...	150	...	...	...	{ 150	...	...	...	...	...
Mr. Francis	...	...	...	...	...	...	...	...	75	...	...	...	...	...	...	...	...	...
Mr. Call	..	...	...	...	...	...	...	...	...	...	...	...	59	...	...	...	...	...
Mr. Allen	74	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		(3) 624	...	...	...	...		(2) 300		(2) 225	...	...		(2) 234	9	1,383	...	
Contribution for Superannuation of Clerks	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,383
Cost of Instruments.																		
Royal Navy	...	...	...	...	...	...	...	...	...	...	...	...	510	...	...	...	...	...
For Office use	...	...	...	...	...	...	...	...	...	...	...	...	300	...	...	...	...	...
Other Commissions	...	...	...	...	...	...	...	...	...	...	...	...	1,500	...	...	...	...	...
														2,310	...	...	2,310	
Observatories, Kew, Eskdale, Valencia, and Farnborough (*see* p. 133)	...	...	...	...	...	...	...	...	...	...	...	...	...	3,881	16	...	3,881	
Allowances for other Observatories Observers, &c.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Aberdeen Observatory	...	...	...	...	...	...	...	...	...	...	...	...	295	...	...	...	...	
Armagh do.	...	...	...	...	...	...	...	...	...	...	...	...	50	...	...	...	...	
Falmouth do.	...	...	...	...	...	...	...	...	...	...	...	...	250	...	...	...	...	
Glasgow do.	...	...	...	...	...	...	...	...	...	...	...	...	75	...	...	...	...	
Stonyhurst do.	...	...	...	...	...	...	...	...	...	...	...	...	56	...	...	...	...	
Anemograph Stations (including St. Helena)	...	...	...	...	...	...	...	...	...	...	...	...	(7) 74	...	7	...	...	
														800	...	800	...	
Incidental Expenses, Forms, &c.	...	...	...	...	...	...	...	...	...	...	...	...	...	140	...	140	...	
Reporters at Telegraphic Stations	...	...	...	...	...	...	...	...	...	600	...	...	...	...	27	600	...	
Investigation of Upper Air :—																		
Director of Experiments	...	...	200	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Mechanical Assistant	...	...	130	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Contribution for International Publication	...	...	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Contingencies, Incidental Expenses	...	...	120	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
				(2) 500	...	...	...	...	...	...	...	...	...	...	2	500	...	
Meteorological Societies :—																		
Second Order Stations	...	...	...	...	...	...	...	...	...	...	75	...	...	...	...	...	...	
Weekly Reports	...	...	...	...	...	...	...	...	...	...	25	...	...	...	...	...	...	
British Rainfall	...	...	...	...	...	...	...	...	...	...	25	...	...	...	...	...	...	
Salary of Scottish Inspector	...	...	...	...	50	...	...	...	...	...	...	...	...	...	1	...	...	
Royal Meteorological Society	...	...	...	...	...	...	...	...	...	...	50	...	...	...	...	...	...	
						(1) 50	...	...	...	...		175	...	...	...	225	...	
Schuster Reader	...	...	...	350	...	...	...	...	...	...	...	...	...	...	1	350	...	
Agents' Fees (Marine)...	...	...	...	...	...	...	...	110	...	...	...	...	...	...	...	110	...	
Presentation Labels	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	6	...	
																	2,731	
Totals (*Dr.*) £1,080	...	3,589	...	1,313	...	300	...	2,124	...	5,754	...	1,769	...	8,652	126	...	24,581	

STATEMENT of CHARGES upon the GRANT for 1912–13 REQUIRED for WORK SANCTIONED in the CURRENT YEAR—*continued.*

—	Administration.		Lectures and Experiments.		Inspections.		I.—Marine.		II.—Forecasts and Storm Warnings.		III.—Statistics, Library and Climatology.		IV.—Instruments and Observatories.		No.	Total.	
	£	£	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Appropriations in Aid.																	
Observatories (*see* p. 134)	...	...	...	...	...	...	...	...	...	...	...	...	...	2,380	...	2,380	...
„ Sun Cards, &c....	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...	48	...
																	2,428
Departmental Expenses	...	5	...	...	...	...	...	5	...	200	...	80	...	145	...	...	435
Incidental Expenses	...	70	...	...	...	...	...	...	...	375	...	...	...	5	...	450	...
„ „ S.O. Account	...	45	...	...	...	...	...	...	...	...	...	...	...	...	...	45	...
																	495
Telegraphic Expenses repaid :—																	
Home	...	...	...	...	...	...	...	...	...	180	...	...	...	...	...	180	...
Foreign	...	...	...	...	...	...	...	...	...	380	...	...	...	...	...	380	...
																	560
Inspection Expenses repaid	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cost of Instruments, &c., refunded—Navy	...	...	...	...	...	...	...	...	...	...	...	...	...	510	...	510	...
„ „ „ Other Sources ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,500	...	1,500	...
																	2,010
Superannuation :—																	
Annuity Receipts	...	(1) 150	...	...	...	...	...	(2) 300	...	(1) 150	...	...	...	(1) 150	...	750	...
Interest	...	50	...	...	...	...	...	...	...	...	...	...	...	...	...	50	...
																	800
Lectures and experiments :—																	
Schuster Readership	...	...	...	350	...	...	...	...	...	...	...	...	...	...	...	350	...
Other Sources	...	...	...	50	...	...	...	...	...	...	...	...	...	...	...	50	...
																	400
Totals (*Cr.*)	...	320	...	400	...	...	...	305	...	1,285	...	80	...	4,738	...	...	7,128
NET TOTALS £1,080	...	3,269	...	913	...	300	...	1,819	...	4,469	...	1,689	...	3,914	...	...	17,453
Parliamentary Grant	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	16,850

The amount of 2½ per cent. Annuities held as on 6th December, 1911, will be £2,119 5*s.* 11*d.*

METEOROLOGICAL OFFICE.

OBSERVATORIES.

ESTIMATED CHARGES upon the GRANT for the MAINTENANCE of the OBSERVATORIES at KEW (Central Observatory), ESKDALE (Magnetic Observatory), and VALENCIA (Western Observatory), and of the branch office at FARNBOROUGH, during the year 1912–13.

(Normal increases of salaries are included.)

1911–12. £		£ s.	1912–13. £	£
	KEW.			
657	Superintendent	—	657	
	Clerk Assistants (two)	305 0		
	Supernumerary Clerk	65 0		
	Boy Clerk	46 16		
	Caretaker and Observer	81 10		
460			498	
	Sundays and Holidays	15 0		
	Overtime	52 0		
52			67	
122	Rent, Fuel and Lighting		100	
70	Repairs		100	
16	Insurances		15	
20	Materials		50	
50	New Instruments		50	
52	Books, Printing and Stationery		15	
61	Allowance for revision		21	
40	Incidental Expenses		52	
1,600				1,625
	ESKDALE.			
400	Superintendent	—	400	
—	Special Assistant	200 0		
143	Clerk Assistant	150 0		
100	Clerk Computer	105 0		
—	Additional Temporary Assistance	30 0		
			485	
109	Mechanic and Caretaker	109 0		
52	Handy man	52 0		
			161	
	Fuel and Light	55 0		
	Furniture, Repairs, &c.	35 0		
	Private Wire	30 0		
	Insurances	14 0		
	Materials	40 0		
	New Instruments	30 0		
	Books, Printing and Stationery	25 0		
	Travelling Expenses	16 0		
	Incidental Expenses	35 0		
196			280	
1,000				1,326
	VALENCIA.			
287	Superintendent	—	287	
82	Assistant	82 0		
39	Handy man	39 0		
			121	
	Cleaning, &c.	22 0		
	Rent, Rates and Taxes	23 0		
	Incidental expenses, including light, fuel, &c.	47 0		
104	New Instruments	30 0		
512			122	530
	FARNBOROUGH (branch office).			
—	Meteorologist	200 0		
—	Other expenses	200 0		
			400	400
	TOTAL—Kew, Eskdale, Valencia and Farnborough	—		3,881

APPROPRIATIONS IN AID.

1911–12.				1912–13.	
	KEW.	£	s.	£	£
450	Gassiot Fund	450	0		
375	National Physical Laboratory	250	0		
5	Grazing rent	5	0		
20	Miscellaneous	45	0		
				750	
	ESKDALE.				
1,000	Royal Society, Parliamentary Grant	1,000	0		
	„ Vote of July 6th, 1911	200	0		
				1,200	
	VALENCIA.				
—	Royal Society, Interest on Trust Fund for Magnetic Observations	12			
—	Grazing rent	18			
				30	
	FARNBOROUGH.				
—	Grant from Advisory Committee for Aeronautics ...	—		400	
					2,380
	Net estimated charge	—		—	1,501

The Estimates include provision for £60 for the salary for Mr. Braby, graduate assistant, in accordance with Minute 314 ; £50 for the Royal Meteorological Society, as provisionally authorised by Minute 308 ; and £12 10*s.* an increase of payment to the British Rainfall Organization for rainfall maps for the Monthly Weather Report, in compliance with the request of the following letter (M.O. 3245) :—

62, Camden Square,
London, N.W.,
13th October, 1911.

MY DEAR SHAW,

FOUR years ago when I estimated that the out-of-pocket expense of preparing a copy of the monthly rainfall map would be reimbursed by £12 10*s.* per annum, the number of stations dealt with was under 500, and all my assistants were then receiving smaller salaries than now. As the map is now prepared from more than 1,000 stations and sent in a finished drawing ready for photographic reproduction, and as the expense of producing it has greatly increased, I hope that the Meteorological Committee will see its way to raising the payment from next year to £25. I do not think that the mechanical work of making a reduction of a large scale map would be undertaken for so little by any commercial firm, and I hope that the Committee will see the justice and moderation of the request.

I am endeavouring to reduce the annual deficit of the working of the British Rainfall Organization without reducing the quantity or the quality of the work done here. I have never felt the limitations of income more than at present when there are so many directions in which the elaboration of existing rainfall data could be extended to the benefit of science and of the public.

Yours, &c.,

HUGH ROBERT MILL.

No provision has been taken for evening reports from Cuxhaven, as suggested in the following memorandum, on the ground that the general question of evening reports from continental stations should be taken up as a whole :—

Evening Reports from Germany.—The lack of telegraphic reports in the evening from Germany is often felt as a serious disadvantage in forecasting. For instance a northerly gale on our east coast which occurred on 25th March, 1911, was missed. Warnings would probably have been issued had information from Germany been available. The Deutsche Seewarte have asked permission to discontinue the evening observation at 6 p.m. at Cuxhaven, which is taken specially at that hour for this Office and transmitted with the following morning's message. It seems preferable to arrange to have the report telegraphed in the evening, and I have ascertained that the Seewarte could probably arrange to have this done for us. The cost of this service is estimated at 15 marks per month; observer's fees in consequence of his being called upon to make an additional journey to the Telegraph Office, which is some distance from the station, and 21 marks 50 pf. per month telegraphic charges, or say £22 per annum.

R. G. K. LEMPFERT.

Further consideration of the Estimates was postponed.

320. *Forecasts.*—A deputation consisting of Mr. A. T. Davis, M.Inst.C.E., M.I.Mun.Cy.E., F.S.I., County Engineer of Shropshire, Mr. R. A. Ryves, A.M.Inst.C.E., F.R.Met.Soc., and Mr. H. G. Turner, A.M.Inst.C.E., Assistant Engineer and Surveyor, Surbiton District Council, waited on the Director of the Meteorological Office on

12th October for the purpose of submitting the following resolution adopted at a Conference of Municipal and County Engineers, 29th April, 1911 :—

> "That this Conference of road engineers and others interested in the improvement of the roads of this country is strongly of opinion that it would be a facility and economy in connection with the branch of Local Government work referred to, as well as in relation to other branches of Municipal Engineering, if His Majesty's Meteorological Department could establish a system of weather forecasts, localised as far as practicable, and telegraphed daily to Municipal and County Offices or Post Offices in as many districts as practicable throughout the country."

It was agreed that a copy of the resolution be sent to the Road Board.

321. *Directors' Report and Accounts :—*

The Director was present at the meeting of the British Association at Portsmouth as Vice-President of Section A., and made communications upon the thunderstorms of 28th and 29th July, and the models representing currents in the upper air as determined by observations of pilot balloons. He also took part in the discussion upon aviation, and as Secretary of the Committee for magnetic observations at Falmouth Observatory communicated the report of the Committee, in which it was mentioned that the magnetic observations at Falmouth must be brought to a close if the customary grant from the British Association, made up to £100 a year by the Government Grant Committee, were discontinued. These grants had been made for the past ten years on the ground of the special necessity for maintaining the observations until the Eskdale observatory was in full working order. It was intimated that an appeal would be made by the Royal Cornwall Polytechnic Society for permanent Government support of the magnetic and meteorological observatory at Falmouth.

Reports of Work for July, August, September, October, 1911.—1. *Marine Division.*—Data for Baltic, Part I., completed for Admiralty ; data for Baltic, Part II., in preparation.

102 meteorological log books, 6 lighthouse registers, examined ; and 519 North Atlantic registers, 276 radio-telegraphy registers, and 96 Indian Ocean registers dealt with, on receipt.

Issues of the North Atlantic Meteorological Chart for July, August, September, and October, completed, November issue began on 12th October. Indian Ocean Meteorological Chart published for August, September, October, and November ; December and January in the press. Extension of Charts to 125° E. nearly complete.

vii. Daily Weather Charts of the Antarctic Ocean, October, 1901, to March, 1904, are now all passing through the press. Monthly Charts for the 30 months, and the Charts showing monthly averages are in preparation

The estimation of cost, at rates ordinarily charged, of work done for Public Offices, £47 12*s.* 6*d.*

2. *Forecast Division.*—(1) Current work on the Daily, Weekly, and Monthly Weather Reports and on the Atlantic Charts has been kept up to date.

(2) Number of wireless messages received :—

	July.	Aug.	Sept.	Oct.
H.M. Ships	1	4	3	0
Mercantile Marine	442	456	479	482

Those received from H.M. Ships have been reported each week to the Admiralty.

(3) Correction to Daily Weather Report for August issued, September prepared.

(4) Forecast Checking. The work is completed up to the end of July.

(5) Wind frequency tables prepared to end of August.

(6) Working charts prepared for binding up to 3rd August.

(7) The number of inquiries answered has been as follows :—

	July.	Aug.	Sept.	Oct.
Prepaid Replies	20	41	22	19
Telegraphic Inquiries (application by letter or personal) ...	35	8	2	3
Inquiries by telephone	20	5	0	2
Personal (answered immediately)	1	1	0	0
Inquiries from ships by wireless	0	0	2	0

(8) Admiralty Forecasts have been sent each day to—

Admiral, Home Fleet, twice daily.

Naval Aeronautical Department, Barrow.

Officers in Command, Devonport, Portland and the Nore.

H.M. Ships within range of wireless telegraphy,

and to the Commodore of the Royal Yachts, as requested.

Expenditure incurred by M.O. on behalf of the Admiralty in sending telegrams amounted 13*s.* 2½*d.* in July, 11*s.* 4*d.* in August, 10*s.* 2*d.* in September, £2 6*s.* 2½*d.* in October, these sums not cluding £1 2*s.*, the charge for telegrams to the Commodore of the Royal Yachts.

(9) The harvest forecast service was continued up to the end of September.

Storm Warnings—Revision of Districts.—In connection with the revision of the list of storm warning stations, the boundaries of the storm warning districts have been revised. The coasts included in the several districts are now as follows :—

1. Scotland, N.E. ...	A. Shetland, Orkney, North Coast of Scotland from Kyle of Durness to Harril Head. B. East Coast of Scotland from Harril Head to Stonehaven.
2. Scotland, E.	East Coast of Scotland, Stonehaven to the Tweed.
3. Scotland, N.W. ...	From Kyle of Durness to Firth of Lorne.
4. Scotland West, North Channel.	From Firth of Lorne to Burrow Head and from Loch Foyle to Strangford Lough.
5. Ireland, N.	From Loch Foyle to Mouth of Galway Bay.
6. Ireland, S.	From Galway Bay to Carnsore Point.
7. Irish Sea	South of a line drawn from Strangford Lough to Burrow Head, and North of Lat. 53°.
8. St. George's Channel...	South of Lat. 53° to a line drawn from St. David's Head to Carnsore Point.
9. Bristol Channel ...	From St. David's Head to the River Camel.
10. England, S.W. ...	From River Camel to River Exe.
11. England, S.	From River Exe to Beachy Head, with Channel Isles.
12. England, S.E.... ...	From Beachy Head to Shoeburyness.
13. England, N.E. ...	From the Tweed to the North of the Wash.
14. England, E.	From the Wash to Shoeburyness.

The most important modifications consist in the splitting of district 1 into two sub-districts, and the extension of district 4 to include the Irish side of the North Channel.

The Sea Forecast Districts will be revised to bring them into harmony with the Storm Warning Districts when the next Annual Report is prepared.

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, Parts I., II., and Part III., Section i., up to date. Part III., Section ii., completed up to April. 195 cards prepared for the Catalogue. Issue of weather notes in connexion with agricultural shows at Peterborough, Brigg, Inverness, Rotherham, Horsham, Welshpool and Knutsford. Inquiries (July to October, 1911), as follows : Newspapers, 54 ; Legal, 26 ; Scientific and Commercial, 218 ; Forecasts, 11 ; General, 14. The receipts in connexion with these amounted to £16 6*s.* 8*d.*

4. *Instruments Division—Observatories.*—Preparation of Hourly Readings for printer. The Hourly Readings, Meteorological Section, for May have been passed for press, and copy for June has been sent to the printer.

The mean monthly velocity of the wind at Armagh, Kingstown, Roche's Point, and Valencia for the years 1906 to 1910 ; and the mean wind velocity at St. Helena for each month of 1910, were worked.

Catalogues of the exhibits in the Museum, the Sunshine Cards in the basement, and the original records kept in the Library and in rooms 5 and 14, have been prepared.

A table is in hand showing the mean amount of sunshine (1891–1910) at numerous stations in the British Islands, and the percentage of the possible amount that could be registered.

The Gibraltar anemograms have been gone through in order to discover the effect of increasing the height of the mast above ground from 20 feet to 31 feet, and from 31 feet to 40 feet.

The Falmouth and Pendennis wind results have been analysed under 8 points with a view of tracing the time when a leakage occurred in the pipes of the pressure-tube anemometer.

The Sunshine Cards from 129 stations have been measured and checked since the last report.

Tabulations of anemograms from five observatories have been made at Pyrton Hill.

Carnoustie and Menaifron have been added to the list of Sunshine Stations.

The general routine work has been kept up to date.

Instruments.—The usual Admiralty and Office work. The following Reporting Stations have been supplied with new instruments to replace others found defective on inspection, viz. : St. James's Park, Malin Head, Portland Bill, Scilly, Blacksod, Jersey, Dunrossness, Valencia, Wick, Roches Point, and Lerwick.

The Standard Barometer at Falmouth Observatory has been repaired and a new tube fitted.

Eight Theodolites for Upper Air Investigation have been distributed as follows :—Captain Sueter, Barrow (1) ; C. J. P. Cave, Esq. (1) ; Aberdeen (2) ; Pyrton Hill (2) ; and M.O. (2).

Seven Fishery Barometers were issued, six at the request of the Department of Fisheries of Dublin for Irish Stations.

The instrument at Porthguarra, Cornwall, has been recalled.

Storm Cones have been renewed at Silloth, Weymouth, Swansea, Barnstaple, Jersey, Douglas, Dunbar, Grangemouth and Whitby.

Fifteen boxes have been despatched for the return of Meteorographs found.

Australasian Antarctic Expedition : A set of Marine Instruments, and a Special Sunshine Recorder and charts, have been lent to the S.S. "Aurora." Three additional Marine Barometers, and a Besson Nephoscope were supplied on repayment.

The following have been supplied with instruments against repayment :—

A. Henderson Bishop, Esq.
Superintendent of Experiments, Shoeburyness.
Dr. H. Cullinan.
W. M. D. La Touche, Esq.
Weston Park, Sheffield.
Department of Agriculture, Leeds.
Spencer C. Russell, Esq.
Mr. G. Rossiter.
Rev. A. Doak, Carr Bridge.
Department of Agriculture, Barbados.
T. V. Philpott, Esq.
Victoria Park, Swansea.
Oswaldkirk Observer.
Elliott Kitchener, Esq., Hemel Hempstead.
Rev. D. E. Shorto, Rugby.
Sir John Dewar, Perth.
Rev. J. S. Begg, West Linton.
J. Healey, Esq., Waterford.

Ten requisitions have been received from the Crown Agents for the Colonies: East Africa Protectorate; Fiji (2); Federated Malay States (2); Gibraltar; Mauritius; Sierra Leone; Malta; and Uganda; also two from the Commonwealth of Australia, and three from the Union of South Africa.

Eight requisitions are still in hand.

5. *Investigation of the Upper Air—Mr. Dines's report for quarter ending 30th June.*—The work of the station was carried on as usual during the quarter. Eight registering balloons were sent up of which seven were found, all giving good records.

At the request of the Joint Kite Committee I supplied balloons and instruments to Father O'Leary, at Mungret College, Limerick, and my son, J. S. Dines, went over to Limerick for three days in June to show Father O'Leary how to send them up. In all three balloons were sent up, and two found.

Quarter ending 30th September.—The work was carried on as usual during the quarter, but owing partly to the calm weather, and partly to illness on my part, very few kite ascents were made.

The work at Pyrton Hill with registering balloons was particularly successful, since out of 11 sent up nine good traces, reaching on the average well over 16 kilometres, were obtained, and one more is probably on its way back.

During the international week, 11–16th September, Mr. H. W. Baker sent up nine balloons from Crinan, N.B., and of these four have been returned, and one or two more may perhaps be.

Instruments have also been supplied to Father O'Leary at Mungret College, who, on behalf of the Joint Kite Committee, has sent up seven balloons during the quarter, of which six have been returned.

I have been engaged since May last in working up the results of the English and Continental balloon ascents, more particularly with a view of finding any relationships which may exist between the variables by calculating the partial and total correlation co-efficients.

Publications.—Report for July, August and September from Clerk of Publications:—

Publications received :	July.	August.	September.
Daily Weather Report	750.	740.	740.
Weekly Weather Report ...	375.	375.	375.
Monthly Weather Report, &c. ...	525 (June).	525 (July).	525 (August).
Daily Observations–Meteorological	200 (May).	200 (June).	200 (July).
Do. Geophysical...	None.	325 (Preface & Jan.).	325 (Feb.).
Hourly Readings	Jan., Feb. & March.	375 Kew & Eskdale.	250 Valencia.
Monthly Meteorological Charts (Atlantic).	600 per month to October (3).		
Monthly Meteorological Charts (Indian).	350 „ „ „ November.		
International Upper Air Observations.	50 as far as November, 1909.		
Sixth Annual Report	—	475.	—
Geophysical and Meteorological Observations–Summary for 1910.	100.*	—	—
Publications issued (or reserved for Stock) :—			
Current Publications :			
Daily Weather Report	720.	720.	723.
Weekly Weather Report	324.	327.	325.
Monthly Weather Report	438 (June).	444 (July).	441 (August).
Daily Observations–Meteorological	172 (May).	172 (June).	172 (July).
Do. Geophysical...	None.	41 (Preface), 41 (Jan.).	1 (January).
Hourly Readings	None.	6 (Jan.), 6 (Feb.).	9 (March).
Monthly Meteorological Charts (Atlantic).	362 (August).	337 (Sept.).	356 (Oct.).

* Also 300 to Kew, 100 to Eskdale.

	July.	August.	September.
Monthly Meteorological Charts (Indian).	230 (August).	223 (Sept.).	294 (Oct.).
Geophysical and Meteorological Observations, 1910.	—	31.	—
Sixth Annual Report	—	—	265.
International Upper Air Observations.	30 as far as November, 1909.		
Back numbers and other Publications:			
Monthly Meteorological Charts (Atlantic).	216.	199.	240.
Monthly Meteorological Charts (Indian).	120.	48.	133.
Presentations to Marine observers	38.	20.	33.
Amount received or due from occasional sales.	17*s.* 0*d.*	31*s.* 10*d.*	44*s.* 4*d.*

New publication: Report of the Berlin meeting of the International Meteorological Committee.—The report is now in slip proof, except for the Table of Climatological data for January, 1905, which is with the printer.

Observatories.—Kew.—The usual tabulation of curves from self-recording instruments has been carried out, and the tabulated meteorological data have been sent weekly to the Office.

The number of absolute observations made in the course of the four months has been as follows:—

Magnetic	Declination	18
	Inclination	17
	Horizontal Force	17
Potential Gradient	on	78 days.
Ebert Apparatus	„	43 „
Wilson „	„	32 „
Ångström Pyrheliometer	„	38 „

During the holiday season the observations with the Ebert were confined to the determination of the number of ions.

Cloud observations have been made regularly on the days of the international programme.

Quick-runs of the magnetographs in connection with the National Antarctic Expedition were made on 17th, 21st, 24th, and 28th July, and satisfactory records obtained.

The usual list of seismic tremors recorded during the first six months of the year was got out and sent to Prof. Milne.

The lists giving the magnetic character of individual days for the second and third quarters of the year have been sent to Prof. v. Everdingen at de Bilt.

The experimental observations with marine barometers have been continued, and the results agree with the deductions made by the Superintendent from the records of verified barometers of the pattern in showing that when barometric changes are slow, the apparent "lag" of these instruments, after tapping, is very much greater than that given by Sir G. Stokes' formula. Even at the fastest natural rates of fall during the period of observation the lag was some five times that given by the formula.

Eskdalemuir.—A progressive fall in sensitiveness of the Electrograph has been observed as compared with the Wulf Electrometer. A new Wulf Electrometer has been obtained and a comparison of this with the old one made. Assuming the new instrument to be correct it was found that the old one gave volt-readings which were too high—the discrepancies amounting to 20 volts in some parts of the scale.

Arrangements have been made for the erection of the Galitzin vertical Seismograph, and the Omori and Wiechert Seismographs, and work on the structures required for this purpose has been begun.

On 16th September Mr. L. Southerns, B.A., B.Sc., of Emmanuel College, Cambridge, arrived, and has taken up his work as Scientific Assistant. During October he has been in charge of the Observatory on account of the absence of the Superintendent on holiday.

Accounts.—Jersey Sunshine Recorder.—The annual payment to the observer in charge of the sunshine recorder at Jersey will be increased from £2 to £3 in accordance with Minute 114. (*See* M.O. 2,764.)

Accounts.—Submitted—The following statement:

	£	*s.*	*d.*
Bank balance on 30th June, 1911	1,599	11	4
Receipts from 1st July to 31st October	11,015	16	6
	12,615	7	10
Cheques drawn from 1st July to 31st October	8,097	4	11
Bank balance on 31st October, 1911	4,518	2	11

Submitted—The following Statement of Accounts for the Six Months ending 30th September, 1911 :—

Receipts.

1910. £ s. d.		£ s. d.	1911. £ s. d.
2,206 14 8	Balance from year 1910–11	—	1,298 16 3
8,375 0 0	Parliamentary vote	—	8,425 0 0
	M.O. Observatories:		
*218 12 4	Kew	684 12 11	
*250 0 0	Eskdalemuir ...	614 15 1	
8 15 0	Valencia	8 15 0	1,308 3 0
	Departmental Expenses Repaid:		
115 13 3	Forecasts, &c. ...	95 13 10	
25 13 8	Marine, Statistics, and Observatories	49 19 5	
18 4 2	Instruments ...	20 13 8	166 6 11
	Incidental Expenses Repaid:		
153 14 10	Forecasts, &c. ...	158 18 5	
38 2 4	Other Branches ...	26 3 8	
26 10 11	Stationery Office Account ...	21 14 0	206 16 1
	Telegraph Charges Repaid:		
120 18 1	Home	171 5 2	
266 12 7	Telegrams sent abroad	342 2 10	513 8 0
	Instruments:		
—	Royal Navy ...	4 10 0	
707 11 6	Mercantile Marine, Stations, &c. ...	706 18 8	711 8 8
25 6 6	Observatory Forms, &c.: ...	—	40 17 3
	Superannuation Account:		
282 10 0	Annuities... ...	284 13 9	
31 15 5	Interest on Investment	45 0 8	
—	Income Tax returned	17 10 0	347 4 5
162 3 2	Lectures and Experiments ...	—	407 10 1
£13,033 18 5			£13,425 10 8

Payments.

1910. £ s. d.		£ s. d.	1911. £ s. d.
500 0 0	Director	—	500 0 0
	Office Salaries:		
3,654 19 5	Monthly	3,855 10 3	
310 18 2	Weekly	323 6 10	4,178 17 1
	M.O. Observatories:		
*365 3 7	Kew	831 0 10	
*276 0 5	Eskdalemuir ...	653 5 10	
226 14 6	Valencia	227 18 7	1,712 5 3
	Office Expenses:		
352 16 1	Rent, Fuel, &c. ...	341 15 11	
78 6 9	Furniture, Fittings, &c....	397 14 6	
171 13 7	Incidental	167 4 1	906 14 6
	Postage and Telegrams:		
142 19 3	General Postage ...	156 3 6	
169 5 9	Postage of Daily Weather Reports...	172 16 1	
1,120 8 6	Telegrams, &c. ...	1,246 12 1	1,575 11 8
186 12 2	Travelling Expenses and Inspections ...	—	171 19 8
516 0 0	Superannuation ...	—	520 7 6
	Cost of Instruments:		
315 9 4	Royal Navy	283 9 9	
635 15 8	Mercantile Marine, Stations, &c. ...	994 13 11	1,278 3 8
1,091 10 7	Auxiliary Observatories, &c.: ...	—	1,002 11 10
297 9 10	Lectures and Experiments ...	—	165 17 4
10 5 2	Antarctic Meteorology...	—	—
	Balance:		
2,529 15 8	Cash at Bank ...	1,356 1 2	
51 14 0	,, at Office ...	37 1 0	
—	Advance for Inspections	20 0 0	1,413 2 2
£13,033 18 5			£13,425 10 8

Liabilities.

£ s. d.		£ s. d.
1,437 12 8	To sundry creditors	1,797 6 2
—	,, salaries reserved	39 10 8
154 12 6	,, superannuation	134 12 6
1,768 19 3	,, balance	470 19 3
£3,361 4 5		£2,442 8 7

Assets.

£ s. d.		£ s. d.
2,581 9 8	By cash at Bank and at Office ...	1,393 2 2
365 9 4	,, Admiralty	330 15 9
180 11 1	,, M.O. instruments in stock ...	237 14 11
233 14 4	,, Sundry debtors (including advance for Inspections).	480 15 9
£3,361 4 5		£2,442 8 7

Note.—On 30th September the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £3,603 2*s.* 1*d.*

* These figures are for the three months ending 30th September.

Observatories.—Statement of Accounts for the 6 months ended 30th September, 1911 :—

KEW.

July—Sept., 1910.	*Receipts.*	1911.
£ s. d.		£ s. d.
212 7 4	Gassiot Trust	446 17 11
—	National Physical Laboratory ...	187 10 0
—	Grazing Rents	2 10 0
6 5 0	Miscellaneous	47 15 0
146 11 3	To Balance	146 7 11
£365 3 7		£831 0 10

July—Sept., 1910.	*Payments.*		1911.	
£ s. d.		£ s. d.	£ s. d.	
197 5 0	Superintendent		356 10 10	
92 13 6	Assistants		203 0 6	
17 17 6	Caretaker...		40 15 0	
2 10 0	Sundays and holidays ...	8 15 0		
11 6 9	Overtime...	49 13 9		
			58 8 9	
—	Rent, fuel, and lighting		46 15 8	
—	Repairs		1 3 7	
15 17 6	Insurance...		—	
16 17 6	Materials		26 14 6	
—	Instruments		35 19 5	
0 11 3	Books, printing, and stationery		26 16 0	
10 4 7	Incidental expenses ...		34 16 7	
£365 3 7			£831 0 10	

ESKDALE.

July—Sept., 1910.		1911.
£ s. d.		£ s. d.
250 0 0	Royal Society (Parliamentary Grant)	500 0 0
—	Dr. Schuster...	104 9 10
—	Miscellaneous	10 5 3
26 0 3	To Balance	38 10 9
£276 0 5		£653 5 10

July—Sept., 1910.			1911.	
£ s. d		£ s. d.	£ s. d.	
100 0 0	Superintendent		100 0 0	
57 10 0	Assistants		147 8 8	
27 6 0	Mechanic and Caretaker		54 12 0	
13 0 0	Handyman		26 0 0	
—	Books, stationery, &c. ...		4 9 8	
—	Insurance		1 3 8	
—	Travelling expenses ...		28 13 5	
	Incidental expenses :—			
27 15 0	Rental of private wire	27 15 0		
13 5 5	Instruments and repairs	108 8 7		
5 13 9	Photographic paper ...	24 1 11		
24 8 2	Coals and carriage of coals, light	14 10 0		
—	Repairs, &c.	—		
7 2 1	Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	16 2 11		
			190 18 5	
£276 0 5			£653 5 10	

VALENCIA.

April—Sept., 1910.		1911.
£ s. d.		£ s. d.
8 15 0	Grazing Rent	8 15 0
217 19 6	To Balance	219 3 7
£226 14 6		£227 18 7

April—Sept., 1910.		1911.
£ s. d.		£ s. d.
137 10 0	Superintendent	137 10 0
61 15 0	Assistants	61 15 0
5 7 0	Rent, rates, and taxes	5 7 0
22 2 6	Miscellaneous expenses	23 6 7
£226 14 6		£227 18 7

THIRTY-NINTH MEETING.

South Kensington, S.W., 6th December, 1911.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	MR. MIDDLETON.
SIR G. H. DARWIN.	DR. SCHUSTER.

322. The Minutes (311–321) of the last Meeting (1st November, 1911) were taken as read, and, with additions to Minute 318, were confirmed.

323. *Forecasts.—Application to the Development Fund* (Minutes 263, 274, 281, 290).—Read—the following letter (M.O. 3,833) from the Treasury :—

21703/11.

Treasury Chambers,
4th December, 1911.

SIR,

ADVERTING to the letter from this Department of the 8th March last, I am directed by the Lords Commissioners of His Majesty's Treasury to state that They have now received the recommendations of the Development Commission on the application of the Meteorological Committee for an advance from the Development Fund in aid of the free distribution of weather forecasts.

The Commissioners report that, in their opinion (with which My Lords concur), a general distribution of information of this kind which has no essential reference to the interests of agriculture or the fishing industry would not be within the scope of the Development and Road Improvement Funds Act. They are therefore unable to recommend that any advance should be made to the Committee.

I am, &c.,
T. L. HEATH.

The Director,
Meteorological Office.

It was agreed to redraft the application in a form that would present the case for the distribution of forecasts exclusively with reference to the agricultural and fishing interests.

The following draft letter to the Road Board with reference to the distribution of forecasts (Minute 320) was approved :—

P.C. D 603.

14th December, 1911.

Distribution of Weather Forecasts.

SIR,

I AM desired by the Meteorological Committee to report to you that a resolution regarding the distribution of weather forecasts adopted at a Conference of Municipal and County Engineers, held on 29th April, 1911, has been submitted for their consideration. The resolution is in the following terms :—

> " That this Conference of Road Engineers and others interested in the improvement of " the roads of this country is strongly of opinion that it would be a facility and economy in " connection with the branch of Local Government work referred to, as well as in relation " to other branches of Municipal Engineering, if His Majesty's Meteorological Department " could establish a system of weather forecasts, localised as far as practicable, and tele- " graphed daily to Municipal and County Offices or Post Offices in as many districts as " practicable throughout the country."

On 12th October I received a deputation appointed by the Conference to communicate the resolution. A copy of the Address presented on that occasion is enclosed. As a result of notices which have appeared in the Press, I have also received letters in support of the suggestion from the Surveyors of Douglas, Isle of Man, and Surbiton.

The Committee welcome the suggestion which has been made to them as they have long felt that the present arrangements for the distribution of forecasts, which so far as the requirements of civil employment are concerned are practically entirely in the hands of the newspapers, are unsatisfactory. The forecasts issued in the evening do not get into the hands of the public until the following morning, when one-third of the period covered by the forecast has expired. Those issued in the morning are published in the "evening" papers, but in country districts these again fail to reach those who may desire to use them sufficiently early to be of service to the fullest extent. The Committee have no funds out of which to defray the Post Office charges for the distribution of forecasts by telegraph.

In considering the utility of the forecasts the Committee desire to lay stress upon the necessity for their regular distribution as distinguished from spasmodic distribution on special occasions. Absolute accuracy is not attainable in the present state of our knowledge. On the average out of

365 forecasts issued in a year 328 are more nearly right than wrong, but 37 are failures, partial or complete. In some circumstances the impression produced by one failure may easily outweigh that of nine complete or partial successes ; there is a better chance of 37 failures being estimated at their true value in relation to 328 successes. On that account the regular distribution of the forecasts in such a manner that they may be accessible to those who are in a position to make practical trial of them at a sufficiently early hour, must be regarded as essential if trial is to be made of the utility and not merely of the accuracy of the forecasts. The Committee would be glad to learn whether the Road Board would be disposed to support the suggestion contained in the resolution.

I am, &c.,
W. N. SHAW.

The Secretary,
Road Board,
Queen Ann's Chambers,
Broadway, Westminster, S.W.

P.S.—I may add that this morning I have received a copy of resolutions of the Spen Valley Literary and Scientific Society, and of the Liversedge Urban District Council in support of the proposal of the Conference.

ADDRESS to Dr. W. N. SHAW, M.A., D.Sc., Director of the Meteorological Office, by Mr. A. T. DAVIS, M.Inst.C.E., M.I.Mun.Cy.E., F.S.I., County Engineer of Shropshire ; Mr. R. A. RYVES, A.M.Inst.C.E., F.R.Met.Soc. ; and Mr. H. G. TURNER, A.M.Inst.C.E., Assistant Engineer and Surveyor, Surbiton District Council.

Submitting a resolution of the Conference of Municipal and County Engineers, 29th April, 1911.

SIR,

WE have the honour to submit for your consideration a resolution passed by the Conference of Municipal and County Engineers, held at Olympia on 29th May, 1911, under the presidency of Sir George Gibb, Chairman of the Road Board.

We regret that on account of the illness of one of our members there has been some delay in submitting this resolution which, however, is not in connection with any fleeting circumstances, but applies to a matter which we hold to be of permanent interest and importance.

The resolution which we have been instructed to submit was as follows :—

> " That this Conference of road engineers and others interested in the improvement of " the roads of this country is strongly of opinion that it would be a facility and economy in " connection with the branch of Local Government work referred to, as well as in relation " to other branches of Municipal Engineering, if His Majesty's Meteorological Department " could establish a system of weather forecasts, localised as far as practicable, and tele- " graphed daily to Municipal and County Offices or Post Offices in as many districts as " practicable throughout the country."

In submitting this resolution we realise that the most suitable time of day for the sending out of the forecasts will necessarily depend, on the one hand upon the convenience of the public at large and, on the other hand, upon your own estimate of the relative values of forecasts issued at different times of the day, having regard to the freshness of the information, its completeness, and the area from which it is derived.

We believe that we shall best carry out the spirit and intention of the resolution which we have the honour to submit, if we point out that a telegraphic forecast "localised as far as possible" will be of value to Municipal and County Engineers at whatever time of day it is issued, and that one forecast a day would be of direct and certain value.

The expression "telegraphed daily to Municipal Offices or Post Offices" would be amply recognised by an arrangement under which there would be a free delivery to County and Municipal Offices of the telegraphed forecasts received at Post Offices.

It may, perhaps, be suggested that a forecast received at about 4.30 p.m. would be the most useful to Municipal and County Engineers, and especially in connection with highway works, since it would enable them to take probable weather changes into account in making their arrangements for the next day's work, while if two forecasts could be issed, one based upon the full information received by the Meteorological Office in the morning and available at about 9.30 a.m. would rank next in importance. This suggestion is made subject to your own opinion, Sir, as to the advantage of either or both arrangements to the public at large, the nature and extent of the reports received by you, and the times at which the information can be made available for issue to the different parts of the country.

We respectfully represent, Sir, that the relatively small cost of issuing such daily forecasts by telegraph would be repaid many times over by the influence which the forecasts would have on the economical expenditure of the sums raised by local rates, and especially in the cost of road maintenance.

We also suggest that the benefits that would accrue to the public would not be restricted to Local Government work, but would ultimately extend to almost every other occupation.

324. *Appointments.*—The Director was authorised to appoint M. T. Spence, born 9th January, 1893, as probationer for the Statistical Division with a view to additional requirements of the Division in respect of Climatological Stations transferred from the Society to the Office (Minute 308), and also to appoint an office boy for the Statistical Division.

325. *New Office.—M.O. Press* (Minute 313).—Reported—the following correspondence with the Stationery Office :—

M.O. 3,551.

H.M. Stationery Office,
London, S.W.,
9th November, 1911.

SIR,

IN reply to your letter of the 2nd instant in regard to the proposed production at the Meteorological Office Press of the lithographic work of the Weekly and Monthly Weather Reports, I beg leave to forward a copy of a written assurance given by Messrs. Wyman & Sons in regard to the limitation of the execution of private work at the Press in your Department.

I have, &c.,
W. G. NEWTON,
For Controller.

The Director,
Meteorological Office.

Wyman & Sons, Ltd.,
Fetter Lane, E.C.,
7th November, 1911.

SIR,

Litho Plant at South Kensington.

IN reply to request made to our representative yesterday we beg to inform you that private work will be produced during ordinary working hours, and no private work will be done which will cause Government work to be set aside and necessitate the latter to be produced by overtime,

We are, &c.,
WYMAN & SONS, LIMITED,
E. Macintosh,
Managing Director.

Superintendent of Printing,
H.M. Stationery Office, S.W.

D. 546.

Meteorological Office,
London, S.W.,
10th November, 1911.

SIR,

WITH reference to your letter of the 9th November (L. 3.091), I propose in reporting Messrs. Wyman's written assurance to the Meteorological Committee to lay down the ordinary working hours as from 8 a.m. to 6.30 p.m., as indicated in my letter of the 2nd instant. I shall be glad to know if this meets with your approval.

I am in correspondence with Messrs. Wyman about the re-arrangement of the printing room.

The Office of Works (Engineering Division) desires to have protection against the disturbance of the uniformity of the lights on the electric circuit in consequence of the variations of load. I am taking that question up with Messrs. Wyman.

I am, &c.,
W. N. SHAW.

The Controller,
H.M. Stationery Office.

M.O. 3,551–2.

H.M. Stationery Office,
London, S.W.,
14th November, 1911.

SIR,

I beg leave to acknowledge the receipt of your letter of the 10th instant, and in reply to acquaint you that for working at the Lithographic Press in your Department Messrs. Wyman & Sons need be allowed no longer hours than those defined in your letter on days other than Saturday. On Saturday the day will close not later than 1 p.m.

I have, &c.,
W. G. NEWTON,
For Controller.

The Director,
Meteorological Office.

Model of the British Isles (Minutes 262, 305).—Read—M.O. 3,626 from Mr. H. F. Brion asking for a grant of money in addition to the agreed payment for the model, on account of the additional work devoted to its preparation beyond what was contemplated in making the estimate, and also asking for a testimonial.

It was agreed that a testimonial be given, and that regret be expressed that the conditions of the Parliamentary grant do not permit the Committee in the circumstances to make a money grant.

326. *Co-operation with the Societies* (Minute 315).—Read—the following letter (M.O. 3,493) :—

H.M. Stationery Office,
London, S.W.,
4th November, 1911.

SIR,

WITH reference to your letter of the 23rd ultimo, I am directed by the Controller to acquaint you that he agrees with the proposal that, in exchange for certain information to be supplied by the Royal Meteorological Society for incorporation in your Monthly Weather Report, the Society should be furnished with copies of the Report for its Fellows, about 850, month by month, at the cost of paper, printing off, and stitching.

I am to add that the charge to be made for the supply on the above terms is estimated at about 32*s.* per month, if the bulk of the Report should not exceed 10 pages, or about 40*s.* per month in cases in which the "Notes on Statistical Tables" would be required to appear as a separate slip in addition.

I am, &c.,
W. G. NEWTON,
Assistant Controller.

The Director,
Meteorological Office,
South Kensington, S.W.

327. *Daily Weather Service.—Telegraphic Station in N.W. Ireland.*—Read—the following letter from the Post Office (M.O. 3,746) :—

General Post Office, London,
24th November, 1911.

DEAR DR. SHAW,

MR. CAREY, who has recently left the Telegraph Branch, has passed on to me your letter to him of the 6th of June last (No. 1,476) (T. 201) suggesting that weather observations might be taken by the Midland Great Western Railway Company, Ireland, either at Achill Sound or at Mulrany, and telegraphed over the Railway wires to Dublin, to be handed in there as ordinary telegrams addressed to the Meteorological Office.

The enquiries have taken rather a long time in consequence of the complicated nature of our Agreements as regards Telegraph work with the Railway Company concerned.

Under these agreements the Company are precluded from transmitting any message over their telegraph wires which does not relate exclusively to the business of the Company, and considerable legal and other complications would be caused by an exception. Before going further, therefore, I should be glad to know whether it would suit you equally well if the weather reports were handed in at the Mulrany Post Office between 6.50 and 7.5 a.m. (Irish time). If so, the Sub-Postmaster would be willing to forward them for a special payment by the Meteorological Office of 5*s.* a week in addition to the ordinary telegraphic charges.

Yours very truly,
A. M. OGILVIE.

W. N. Shaw, Esq., LL.D., Sc.D., F.R.S.

Mallaranny is the more accessible for inspection, but at Blacksod the observers are Coastguards, who, taking everything into consideration, are the most satisfactory observers for outlying telegraphic stations.

The alternatives as to annual cost may be set out as follows :—

	Observer.	Telegraphy.	Inspection.	Total.
	£ *s.*	£ *s.*	£	£ *s.*
Blacksod (Coastguard)	17 13	36 18	7	61 11
Mallaranny (possibly Railway Staff)	23 18	13 0	4	40 18

This shows a difference of £20 13*s.* in favour of Mallaranny, which might be reduced to £11 by a special arrangement with the telephone operator at Blacksod.

The position of Blacksod is a little more favourable than Mallaranny.

The Director was requested to report further on the matter.

328. *Programme of Publications for* 1912–13 (Minute 318).—*Maps of the Weekly Weather Report.*—Submitted—the following memorandum :—

In the present arrangement of the Weekly Weather Report three maps are devoted to each day. They give for Europe the pressure and winds at 7 a.m. and 6 p.m., and the temperature and weather at 7 a.m., and are accompanied by brief "remarks" referring to extremes of temperature and notable changes recorded during the day.

It is suggested to substitute for these three charts a single chart of the area shown in the attached outline. The elements which it is proposed to show are pressure (by isobars), winds, temperatures and weathers for the hour of morning observation (7 a.m. G.M.T. in the British Isles and surrounding countries).

By delaying the publication of the charts for one week so as to issue the statistical tables for a given week with the charts for the preceding week, it will be possible to make the charts much more complete than those now published in the Monthly Charts of the North Atlantic. The delay will make it possible to include :—

(1) Data from the North American Continent, taken from the Canadian Daily Weather Report.

(2) Information received by wireless or by post from ships crossing the Atlantic to a much greater extent than is possible in the present maps.

(3) Information as to the temperature of the Air and of the Sea Surface over the North Atlantic.

If publication within the week is continued, a telegraphic report from Toronto should be arranged. Inquiry is being made as to the cost under the new scale of charges for cable messages.

It was agreed to reproduce a daily map of the Atlantic and of Europe and Eastern Canada on the scale of $1 : 4 \times 10^7$, for 7 a.m. G.M.T. on the eastern side and over the sea; and for 8 a.m. (75th meridian time) on the western side; to delay the publication of the maps until the American or Canadian weather reports are received, and to page separately the statistical and lithographic parts of the Report.

New forms for the tables for the Monthly Weather Report were approved.

Programme of Work for 1912 (Minute 318).—The programme as set out in the revised minutes for 1st November, 1911, was approved.

329. *Estimates for* 1912–13 (Minute 319).—The following additions were approved:—

£25 as an addition to £150 secured by an annuity from the Commissioners for the reduction of the National Debt as superannuation allowance for Mr. R. H. Curtis, Superintendent of the Instruments Division, at the rate of one-half of the average of his salary for the past three years, upon his retirement on 31st March, 1912.

£25, increase of salary for Mr. Allingham, Principal Assistant in the Marine Division, to date from 1st December, 1911.

£5 to provide for normal increases of salary in 1912–13 for H. L. B. Tarrant and E. L. Ardley, transferred on the recommendation of the Director to the class of Clerk Assistants.

£10, additional allowance for the revision of salaries.

The estimates, as set out in the revised Minutes of 1st November, 1911, were approved, and the following letter to the Treasury was also approved:—

SIR, 11th December, 1911.

IN reply to your letter 18,384/11 of the 10th October, 1911, I am instructed by the Meteorological Committee to forward an Estimate of Expenses of this Office for the financial year 1912–13, amounting to £24,581. The Estimate of the Appropriations in Aid amounts to £7,128. The Parliamentary Grant in Aid is fixed at £16,850, so that the expenses, on the basis set out, are estimated to exceed the annual income in the coming year by £603.

2. In explanation of this position I am instructed to refer to some of the items in the comparison of the Estimate for the coming year with those voted for the current year. The notable increases are in Office Salaries (£397); Observatories (on balance), £203; Postage and Telegrams (on balance), £150. The other item which must be referred to is Superannuation, on which the net decrease of expenditure is set out as £173.

3. I am to deal first with the items which concern the special expenditure of the Office, as distinguished from the Observatories, and subsequently to take up the questions concerning the Observatories.

4. Under the head of Office Salaries the sum of £156 is attributable to expenses due to the changed conditions at the new Office, where, as joint occupiers, we have to conform to the practices of Government buildings; about £50 is due to the maintenance of instruments in operation in the new building, and a laboratory and workshop; £235 is assigned for increase of staff to deal with the increase of work at the Office and Observatories (including £75 for work hitherto done by the Royal Meteorological Society, against which there is a corresponding credit under the head of Allowances to auxiliary observatories, &c.). The total of these new charges, £441, exceeds the increase, £397, shown in the Estimate, so that the sum applied in ordinary salaries shows a reduction. This is on account of readjustments after retirements.

5. Of the increased payment to the Post Office, £50 for postage represents increased work of the Office. £100 is allowed on account of telegraphy to provide for a number of charges made by the Post Office, unforeseen, but apparently in order, in consequence of the adoption of delivery by tube instead of a private wire, and losses incidental thereto.

6. A Superannuation charge of £208 is, by direction of the Committee, a charge upon current account for the pensions of certain classified clerks, which in ordinary circumstances would have been charged against the accumulated funds. This sum may, therefore, be regarded as a contribution to the fund, but there is no provision in the Estimate for any further contribution.

7. The Committee desire to take Their Lordships' pleasure upon one point of increased cost which is not included in the Estimates. The post of Superintendent of Instruments will become vacant at the close of the current financial year. The initial salary assigned for the new appointment is £350. The Committee have reason to believe that they would be able to secure the services of a man of exceptionally high scientific distinction, who would be of the greatest assistance in the scientific work of the Office, especially in connexion with the Observatories, if they were able to offer a salary of £500 a year rising to £600 with a ten per cent. addition for endowment assurance in lieu of pension. It implies an ultimate addition of £250 a year to the Grant. The Committee venture to appeal to Their Lordships for means to enable them to take advantage of this exceptional opportunity.

OBSERVATORIES.

8. As regards finance the charge for the Observatories of the Meteorological Office shows a net increase of £203. This balance is made up of £125 for Kew, £126 for Eskdalemuir ; the difference is accounted for by a credit for auxiliary observatories.

9. *Kew Observatory.*—The increased charge for Kew Observatory is merely the result of the withdrawal of one-half of the contribution by the National Physical Laboratory towards the Superintendent's salary and the expenses of maintenance. It is anticipated that the withdrawal will take effect in October next, when the testing work will be removed to Teddington. In consideration of this contribution the sum proposed for the Parliamentary Grant when the Observatory was taken over by the Office in 1910 was reduced by £200, and when the contribution is withdrawn the amount of the Grant would fall to be reconsidered, but for the half-year the Committee have carried the difference to the general account.

10. In view of the proposed removal of the testing work, and the adaptation of the building to the special requirements of the Office in respect of a Central Observatory, the Committee have considered with approval the plans prepared by the Office of Works, which include revised sanitary arrangements. The Committee are strongly supported by the Gassiot Committee of the Royal Society in the view that the re-arrangement of the interior of the building is a matter of the greatest urgency from the point of view of sanitation, and that the plans prepared by the Office of Works will afford accommodation for a Central Physical Observatory which will be creditable to all concerned. They beg leave, therefore, to urge most strongly that provision may be made in the Estimates for the execution of the work in the coming year.

11. *Eskdalemuir Observatory.*—The estimate for the year shows expenditure £126 in excess of the sum of £1,000 granted by Parliament to the Royal Society for the maintenance of the Observatory. A similar sum was found necessary in the past year. The situation is not without difficulty. The Meteorological Committee hold that by continuing to receive the Grant, the Royal Society accepts the residuary responsibility for expenditure, and is in the first instance responsible for the deficit. The Royal Society, however, when the administration was vested in the National Physical Laboratory, regarded the Laboratory funds as being security for the Observatory expenses, and now regard the Meteorological Office funds in the same light. After prolonged negotiation the Committee have obtained £450 from the Royal Society Donation Fund, to be spread over *two years*, for an assistant, with special reference to Seismology, and for the incidental expenses of certain special seismological work, on the express understanding that no further grant will be made from that fund for the expenses of the Observatory. Without entering into the details of argument the Committee have to recognise that they must face the future on these terms, that the Royal Society will not meet the deficit out of their own funds, and that from the year 1913-14 the Committee must accept the financial responsibility for the working of the Observatory. The Committee have no alternative but to bring the matter to Their Lordships' notice. Since the Observatory is a meteorological as well as a magnetic observatory they have no objection on principle to making a subvention, but they have no funds available for the purpose.

12. The situation is made more difficult by the facts :—

(1) that for the permanent working of the Observatory adequate means of locomotion must be provided, and the initial cost at least will fall upon the Observatory ; and, (2) that the Superintendent was appointed three years ago at a salary of £400, with no provision for increase or retiring allowance, and he cannot be expected to continue on those terms. The Gassiot Committee of the Royal Society is of opinion that the Observatory has become of such importance that the Superintendent ought to have the status of a permanent official with a salary rising to £500, and an addition for endowment assurance. The position which the Observatory is taking in the scientific world fully bears out this opinion.

13. The Grant of £1,000 for the maintenance of the Observatory was made by the Government with the object of restoring the efficiency of the magnetic observations impaired by the proximity of electric railways to Kew. The Committee believe that it was intended that Eskdalemuir should take over the larger part of the work previously carried on at Kew, and in any case it seems the wise policy, both from the administrative and the scientific points of view, that the various branches of geophysics should be prosecuted simultaneously in one establishment. Seismological observations were carried on at Kew, and naturally they have already found their place at Eskdalemuir. The Seismological Department there has received an equipment by gifts from private donors of instruments to the value of several hundreds of pounds, and this proves that the most competent judges consider that seismology belongs properly to the work of such an observatory.

14. Their Lordships will be aware that in 1909 the Committee expressed their willingness to economise so far as meteorology is concerned by withdrawing the grant from Kew Observatory. The proposal met with the strongest protests from the representatives of the Royal Society, on the ground that it would close Kew Observatory, which is the mother institution. The present responsibilities of the Committee in regard to the observatories result from that proposal. They therefore feel themselves estopped from raising the suggestion in relief of their present difficulties, and can only ask Their Lordships in due course to make a sufficient increase in the grant on account of Eskdalemuir to enable the Committee to make the necessary provision for the extended work of the Observatory.

15. The Committee have considered whether any plan might be adopted for increasing the Appropriations in Aid by making charges for services rendered. They have already explained to Their Lordships that as the work becomes more efficiently organised and the public learn to use the information distributed, the receipts from these sources diminish, since payments are only assessed on the basis of out-of-pocket expenses. The only suggestion that has been made to them that

promises any substantial return, is one for making the "health resorts" repay a sum representing the cost of inspection of the stations as a condition of communicating the information daily to newspapers. By adopting this suggestion the Office might certainly either increase its funds or curtail its work, but there is no evidence as to the saving that would be effected thereby, and it may, moreover, easily be argued that the Office serves the public better by supervising without payment the observations communicated to the press on behalf of the local authorities.

16. For the financial year 1912–13 it will be seen that the expenses as set out can be met by an expenditure of £603 out of the Committee's balance. The Committee propose to rely upon the balance for the coming year, and not on this occasion to ask Their Lordships to increase the annual grant for these expenses. The one point on which they would ask for Their Lordships' present consideration is the question of a special provision for the Superintendent of Instruments, which must be taken now if at all.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
Whitehall, London, S.W.

The following draft letter to Health Resorts (Minute 307) was submitted:—

Supply of information to the Press.

SIR,

FOR many years it has been the practice of the Meteorological Office to accept from observers at health resorts daily telegrams reporting the duration of bright sunshine to be included in the evening reports of weather which are compiled in the Office for communication to Newspapers and Press Agencies.

Recently the number of stations has been much enlarged and the list now includes a considerable number of stations maintained for Local Authorities or Municipal Societies. Moreover, the information in the reports has been amplified by including observations of other elements besides sunshine, so that the Office now has material for a comprehensive evening report on the weather at the principal health resorts of the country.

Representations have been made from time to time that the Office should communicate this information in full to the press, and so obviate the necessity for telegrams from individual places to individual newspapers, but other special duties of the staff employed on the evening weather service have taken up so much of the time available that the immediate compilation of the full reports in a form suitable for distribution has not been possible. The practice has been to supply a schedule of the observations of bright sunshine, and to utilise the information regarding other elements in the "remarks" which accompany the forecasts. A copy of the reports as communicated to the press is appended. A full schedule of the readings reported by telegraph (with the exception of pressure) is included in a special table on page 4 of the Daily Weather Report of the following day, of which a copy is also enclosed.

By a recent reorganisation of the telegraphic work of the Office in connexion with the removal to new premises it has now become possible to compile the observations from health resorts in the form shown in the schedule marked D., [B in Minute 281] so that they can be included with the forecasts and remarks that are issued, free of charge, each evening to the Newspapers and Press Agencies. In this way it is hoped that effective distribution of the information to provincial as well as metropolitan newspapers may be organised. The arrangement should result in a considerable reduction in the number of the telegrams which it is now necessary to send in order to communicate the information to the press. For each station a single telegram to the Office would take the place of the telegrams now communicated to the various newspapers.

In accepting reports for issue to the press, the Office accepts a share of the responsibility for trustworthiness of the information supplied. In the matter of meteorological statistics trustworthiness depends only partly on avoiding actual errors on the part of observers. It is essential also that the instruments, their exposure, and the rules followed in reading them should be in accordance with accepted international practice. Omissions in this respect have greatly reduced the usefulness of many observations on which both time and money have been expended, as the results cannot be compared effectively with those from other places.

Regular inspection of the stations is essential in order to secure this end. In the case of the official stations that supply the information on which the daily forecasts are based inspection once a year is a rule of the Office. In the case of other stations reporting to the Office annual inspection has not been practicable on account of the cost in time and money. On the average it has not been possible to arrange for inspection more frequently than once in three years. The Meteorological Committee feel that annual inspection is desirable if the returns are to be communicated day by day to the Press, but the inspection each year of a large number of stations in addition to the telegraphic reporting stations is beyond the resources of the Office.

The estimated average cost to the Office of the inspection of a station is £4, and the Committee have sanctioned the extension of arrangements for annual inspections to include the stations wishing to contribute their observations to the evening press report, provided that the authorities controlling the stations are willing to reimburse the Office to the extent of the sum named, viz., £4 per annum, as the cost of inspection.

It is proposed to bring the new scheme into operation on the 1st May, 1912, and from that date the rule will be for the Office to undertake as heretofore the inspections without payment of stations contributing observations at 7 a.m. to the Daily Weather Report, and to make it a condition for

including observations in the evening reports that regular provision should be made for the inspection of the contributing stations as indicated in this letter.

I should be glad to know if I have your permission to include the reports from your station among those to be circulated each evening to the press on the terms indicated, in order that I may make the necessary provision for inspection during the ensuing summer.

I am, &c.,

The matter was postponed pending the consideration of the Estimates by H.M. Treasury.

330. *Director's Report and Accounts* :—

Forecasts, &c., to Royal Yacht.—A letter has been received from Commodore N. C. Palmer, Commodore of Royal Yachts with reference to the forecasts and reports which have been sent to the "Victoria and Albert" during the year 1911. The Commodore says, "I beg to state that the information you have sent has been of the greatest assistance, and I wish to again thank you for your great courtesy in complying with the applications at all times."

Stations in Cyprus.—Mr. J. I. Craig has reported (M.O. 3,148) that an inspector of the Egyptian Survey Department has visited the stations in Cyprus. On his report a new measuring glass for the rain gauge at Limassol P.W.D. Station has been sent, as the Office has hitherto supplied the instruments for Cyprus without charge.

Endowment Assurance.—An application of Mr. Lempfert's for permission to invest the sums provided in his case for endowment assurance in Leasehold or Sinking Fund Assurance with the Sun Life Office has been approved, as complying with Minute 240.

Publications.—The text of the "Fisherman's Handbook," by Captain Hepworth, is ready, and also three papers which form the contribution of the year to the series "Meteorological Office Geophysical Memoirs," which is to form a continuously paged supplement to the Year Book. The titles of the papers are as follows :—

No. 1. The effect of the Labrador current upon the surface temperature of the North Atlantic; and of the latter upon the temperature and pressure over the British Isles, by Captain Hepworth.

No. 2. Further contributions to the investigation of the upper air, comprising the vertical temperature distribution in the atmosphere over England, and some remarks on the general and local circulation, reprinted from the Philosophical Transactions, and Total and Partial Correlation ratios between sundry variables of the upper air, by Mr. W. H. Dines; with a preface by Dr. W. N. Shaw.

No. 3. Graphical construction for the epicentre of an earthquake, by Mr. G. W. Walker.

The MS. copy for these publications is laid on the table.

Reports of Work for November, 1911.—1. *Marine Division.*—Data for Baltic, Part II., in preparation for the Admiralty.

29 meteorological logbooks, 1 lighthouse register, examined ; and 123 North Atlantic registers, 60 radio-telegraphy registers, and 23 Indian Ocean registers, dealt with on receipt.

Issue of the North Atlantic Meteorological Chart completed for November; December issue began on 16th November. Indian Ocean Meteorological Chart published for December ; January and February in the press. Extension of charts to 125° E. nearly complete.

vii. Daily Weather Charts of the Antarctic Ocean, October, 1901, to March, 1904, are now passing through the press. Monthly charts for the thirty months, and the charts showing monthly averages are in course of completion.

The estimated cost, at rates ordinarily charged, of work done for Public Offices, £13 7*s.* 6*d.*

2. *Forecast Division.*—(1) Current work has been kept up to date.

(2) Number of wireless messages received during November has been (1) from H.M. Ships 8, (2) from ships of the Mercantile Marine 445.

(3) Corrections to Daily Weather Report for October issued.

(4) Forecast Checking completed up to 27th September. Results summarised for the period January to June.

(5) Wind frequency tables prepared up to the end of October.

(6) Working charts prepared for binding up to the middle of September.

(7) Storm Warning Checking. The results for the months January to June, 1911, have been summarised and the usual table has been prepared for publication in the Annual Report.

(8) Inquiries :—

Prepaid Replies	46
Other Telegraphic Inquiries	7
Wireless Inquiries	1
Telephone Inquiries	4
Personal Inquiries	2

(9) A report on the Harvest Forecast service of 1911 has been prepared by Mr. Harries. A table showing the result of a comparison of the forecasts with the reports of weather supplied by the recipients is appended hereto.

HARVEST FORECASTS, 1911.

RESULTS OF CHECKING, FROM OBSERVATIONS SUPPLIED BY SUBSCRIBERS.

District.	Place.	Daily Forecasts.					Further Outlook.				Spells.	
		Number Checked.	Complete Success.	Partial Success.	Partial Failure.	Complete Failure.	Number Checked.	Complete Success.	Partial Success.	Complete Failure.	Successes.	Failures.
1	C. Blair, Tillicoultry ...	—	—	—	—	—	—	—	—	—	2	1
2	T. E. W. Dobson, Cockle Park.	—	—	—	—	—	—	—	—	—	6	2
	J. B. Lowes, Allan's Green.	—	—	—	—	—	—	—	—	—	3	1
	G. Wailes, Husthwaite	—	—	—	—	—	—	—	—	—	—	1
3	S. Hodgkinson Lowe, Kelling and Salthouse.	84	40	37	6	1	25	13	8	4	—	—
	G. E. Palmer, Bengeo ...	6	2	4	—	—	—	—	—	—	—	—
	W. Nisbet, Weston (Herts).	42	26	14	2	—	17	12	—	5	2	3
4	P. Eliot Scott, Walcot...	6	3	1	2	—	3	2	1	—	—	—
5	J. Rutherford, Highclere.	66	32	24	9	1	23	17	2	4	—	—
	S. Pennington, Shinfield.	12	10	1	1	—	6	5	—	1	2	—
	Col. Bibby, Selborne ...	6	4	2	—	—	4	3	—	1	—	—
	R. Osmond, Weston (Berks).	17	8	8	1	—	4	4	—	—	—	—
6	H. L. Macdonald, Dunach.	—	—	—	—	—	—	—	—	—	4	1
	T. M. Macdonald, Taynuilt.	—	—	—	—	—	—	—	—	—	2	1
7	H. Beckett, Northwich	11	5	4	2	—	4	3	1	—	3	1
	W. Jowett, Mellor ...	—	—	—	—	—	—	—	—	—	4	—
	H. Nowell ffarington, Leyland.	—	—	—	—	—	—	—	—	—	11	3
	W. Little, Llandudno ...	104	62	31	10	1	34	27	5	2	11	4
8	J. L. Williams, Ammanford.	12	10	1	1	—	10	9	—	1	1	—
	W. W. David, Pontypridd.	6	3	3	—	—	—	—	—	—	—	—
	R. A. Daniell, Linkinhorne.	24	11	10	3	—	7	6	—	1	—	—
	A. C. Polwhele, Polwhele	30	19	8	3	—	13	11	—	2	—	—
	Totals	426	235	148	40	3	150	112	17	21	51	18
	Percentages ...	*100*	*55·2*	*34·7*	*9·4*	*0·7*	*100*	*74·7*	*11·3*	*14·0*	*73·9*	*26·1*

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, Part I., II., and Part III., Section i., up to date. Part III., Section ii., completed up to August. 11 cards prepared for the Catalogue. Inquiries as follows: Newspapers, 5; Legal, 17; Scientific and Commercial, 53; Forecasts, 1; General, 2. The receipts in connexion with these amounted to £12 13*s.* 8*d.* Letters have been received from 53 stations hitherto contributing observations to the Royal Meteorological Society, offering to make returns to the Office from 1st January, 1912.

4. *Instruments Division.—Observatories.*—Preparation of Part IV. of Year Book for 1911 for the printer:—The June sections are in print, copy for July and August has been sent to the printer, and the conversion of the hourly values for September into C.G.S. units is in hand.

South Shields has been adopted by the Meteorological Office as an anemograph station. Pressure-tube records from January, 1909, to the present time have been received from there, and are now being tabulated.

A table has been prepared showing the mean monthly amounts of sunshine and their percentage of possible amount for the 20 years, 1891–1910, at 42 stations in the British Islands.

The examination of the observatory returns, checking the measurements of the sunshine cards, and tabulation of the rainfall and wind records, have been kept up to date.

The curves and tabulations, received from the observatories, have been satisfactory.

Instruments.—The usual Admiralty and Office work.

St. Ann's Lighthouse Telegraphic Station was supplied with a new minimum thermometer in lieu of one broken, and Theodolite No. 2 was lent for balloon work in Scilly.

Storm Cones were renewed at Broughty Ferry, Killibegs, Bo'ness, King's Lynn, and Donaghadee.

Boxes were sent for the return of Meteorographs to Youghal (Co. Waterford) and Great Missenden.

The following were supplied with instruments against repayment :—

The War Office.	A. Watt, Esq., Edinburgh.
J. Healy, Esq.	Barnstaple Observer.
Dover Corporation.	Cockle Park Observer.

Three Crown Agent's requisitions have been received, viz., S. Nigeria (2), Basutoland.

Six Colonial requisitions are still in hand.

Publications.—Report for October and November from Clerk of Publications :—

Publications received :	*October.*	*November.*
Daily Weather Report	740	750
Weekly Weather Report	375	375
Monthly Weather Report, &c. ...	525 (September)	525 (October)
Daily Readings—Meteorological ...	200 (August)	200 (September)
Do. Geophysical ...	325 (March)	325 (April)
Hourly Readings	April, May and June, 375 Kew and Eskdale, 250 Valencia.	
Monthly Meteorological Charts (Atlantic).	600 per month to December (3).	
Monthly Meteorological Charts (Indian).	350 „ „ December.	
International Upper Air Observations.	None.	
Publications issued (or reserved for Stock) :—		
Current Publications :		
Daily Weather Report	723	746
Weekly Weather Report	322	323
Monthly Weather Report	437 (September)	438 (October)
Daily Readings—Meteorological ...	172 (August)	173 (September)
Do. Geophysical ...	22 to 27 (Preface and January to March).	—
Hourly Readings	9 (April, May and June).	
Monthly Meteorological Charts (Atlantic).	362 (November)	303 (December)
Monthly Meteorological Charts (Indian).	156 (November)	208 (December)
Geophysical and Meteorological Observations, 1910.	1	—
Sixth Annual Report	4	62
International Upper Air Observations.	—	3 (September–November, '09)
Back numbers and other Publications :		
Monthly Meteorological Charts (Atlantic).	171	217
Monthly Meteorological Charts (Indian).	44	58
Presentations to Marine observers	41	37
Amount received or due from occasional sales.	15*s.* 9*d.*	*£22 1*s.* 5*d.*

New publication : Report of the Berlin meeting of the International Meteorological Committee.—The report is now in paged revise.

Observatories.—Kew.—The usual tabulation of curves from self-recording instruments has been carried out and the tabulated meteorological data have been sent weekly to the Office.

The number of absolute observations made from 27th October, the date of last report, to 27th November was—

Magnetic	Declination	4
	Inclination	4
	Horizontal Force	4
Potential gradient		17 days.
Ebert apparatus		17 „
Wilson „		17 „
Ångström pyrheliometer		3 „

Quick-run magnetic curves were taken on two days in connexion with Captain Scott's Antarctic Expedition, and international cloud observations were made on three days.

* This amount includes £20 5*s.* for the supply against repayment of German-Danish synoptic charts of the N. Atlantic for the period December, 1904—November, 1905, charged against the Office.

A quick-run entails a certain loss of trace, owing to the time taken to put on and take off papers, alter the clock gear, adjust the lights, &c. Mr. Walker recently complained of this, as causing a loss of about 30 minutes trace on each occasion at Eskdalemuir. Owing probably to proximity of dark photographic room, the loss here was less, but still averaged about 18 minutes. During the last quick-run arrangements were made to get the quick-run trace on the same sheet as the slow, and the consequent loss of trace time was reduced to seven minutes.

Owing to Mr. Dobson being available, much more time has been given to the Ebert and Wilson apparatus observations, mobility of ions as well as their number being measured on all occasions. Mr. Dobson, however, has found it necessary to increase the duration of the mobility of ions observations to obtain moderately reliable results.

The data for the Geophysical Journal have been got out up to the end of September. It has, however, not yet proved possible to commence the tabulation of the internationally selected magnetic quiet days for 1911. The selected days for the first six months have now been published at de Bilt.

Eskdalemuir.—The normal work of the observatory has been carried on. The arrears of tabulation involved by the Superintendent's absence on holiday have been overtaken.

The following points occur for comment :—

Magnetism.—The apparent small drop of sensitiveness of the West Adie recorders noted in August and September has disappeared.

Electricity.—The old Wulf electrometer has been compared with the new one, and the result shows that a considerable change has taken place. I have sent the old electrometer to Bushy for confirmation and a request that the instrument should be tested at different temperatures.

Seismology.—The new piers have been made and the partition is almost finished. I hope to start the installation of the new seismographs in the course of next month.

Superannuation Annuities.—Reported—the purchase on 14th October, 1911, of £356 16*s.* 4*d.* of 2½ per cent. Annuities, at a cost, including brokerage, of £269 (*see* Minute 275).

Also—the purchase of an Annuity of £150 on the life of Mr. Charles Harding. The purchase was completed on 20th November and the first quarterly payment will be due on 5th January, 1912. (Minute 282.)

The consideration for the purchase of the Annuity was the transfer to the Commissioners for the reduction of the National Debt of 2½ per cent. Annuity Stock held for the Office to the extent of £1,840 12*s.* 6*d.* nominal.

The amount of 2½ per cent. Annuities remaining in hand is now £2,119 5*s.* 11*d.*

The charges made by the Bank for commission, &c., amounted to £1 14*s.* 6*d.* which has been charged to the Office current account.

Mr. Harding has asked that the annuity may be paid monthly instead of quarterly, and instructions have been given to that effect.

Accounts.—Reported—that Munster, Simms, & Co., of 7, Albert Square, Belfast, after ordering information with regard to the weather in relation to the sugar crop in Germany at a cost of 30*s.*, had referred a telegraphic remittance of 5*s.* by way of payment, and that after long correspondence Messrs. Claude Lumley & Co., Solicitors for the defendant in Rex *v.* Morrison, had excused themselves for not completing the customary payment of the Office fee for attendance in court.

Submitted—the following statement :—

	£	*s.*	*d.*
Bank balance on 31st October, 1911	4,518	2	11
Receipts from 1st–30th November, 1911	248	9	4
	4,766	12	3
Cheques drawn from 1st–30th November, 1911	1,935	5	2
Bank balance on 30th November, 1911	£2,831	7	1

FORTIETH MEETING.

South Kensington, London, S.W., 7th February, 1912

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	THE HYDROGRAPHER.
SIR G. H. DARWIN.	MR. MIDDLETON.
CAPTAIN HARVEY.	DR. SCHUSTER.

331. The Minutes (322–330) of the last Meeting (6th December, 1911) were read and confirmed.

332. *New Office.—Priority for Meteorological Telegrams* (Minute 313).—Read—the following letter (M.O. 4020) :—

23077/11. Treasury Chambers,
SIR, 20th December, 1911.

WITH reference to your letter of the 21st September last respecting the telegraphic arrangements of the Meteorological Office, I am directed by the Lords Commissioners of His Majesty's Treasury to acquaint you that They have requested the Postmaster-General to take the necessary steps to arrange with the Meteorological Office for giving priority under the Telegraph Acts to (*a*) the telegrams transmitted either to the Meteorological Office or from this country to the Continental Meteorological Offices, which supply the data for the working meteorological charts of this and other Countries, and (*b*) the Storm Warning telegrams transmitted from the Meteorological Office.

I am, &c.,
T. L. HEATH.

The Director,
Meteorological Office.

M.O. Press (Minute 325).—Reported—that as the second machine had not been installed by 31st December, 1911, and it was intimated by the printers that they had received no formal authority to proceed, a formal request was sent on 3rd January, 1912, to Messrs. Wyman & Sons to proceed with the installation ; and in a further note of 10th January they were formally asked to put themselves in communication with the Office of Works, as required by the contract. The Office of Works has asked for a recoverable order to defray the expense, estimated at about £40, of providing a cable of sufficient capacity to supply current to both machines without interfering with the steadiness of the lighting. To avoid further delay, as the breakdowns on the single machine give rise to frequent complaints from the recipients of the Daily Weather Report, a recoverable order has been given, waiving for the time the question of the claims of the Office in the matter under the lease.

333. *Daily Weather Service.—Spurn Head* (Minute 316).—The provision of a telephone for communication between Spurn Head lighthouse and the residence of the postmistress at a cost of £3 15*s.* a year (P.O. letter of 27th January, M.O. 373) was approved.

334. *Supply of Information to the Press.*—It was agreed to issue the letter to Health Resorts, as printed in Minute 329.

335. *Estimates for* 1912–13 (Minute 329).—Read—the following letter (M.O. 535) from the Treasury :—

22843/11. Treasury Chambers,
SIR, 7th February, 1912.

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letter of the 11th December last (C.06) submitting the estimate for the Meteorological Office for 1912–13.

In reply I am to inform you that My Lords will be prepared to ask Parliament to vote a sum of £17,000 as a grant in aid for 1912-13 and They trust that this sum may be made to suffice in subsequent years.

The necessary provision has been made in the estimate for Public Buildings, Great Britain, for structural alteration and drainage works at Kew Observatory.

I am, &c.,
T. L. HEATH.

The Director of the
Meteorological Office.

Grants for Auxiliary Observatories. — Falmouth Observatory. — Submitted—the following letter (M.O. 3,928) and report from the Honorary Secretary of the Observatory Committee of the Royal Cornwall Polytechnic Society with regard to the meteorological and magnetic work of the observatory (Minute 321) :—

The Observatory,
Falmouth,
9th December, 1911.

DEAR SIR,

Falmouth Meteorological and Magnetical Observatory.

The work of the Falmouth Observatory was originally undertaken at the request of the Meteorological Committee of the Royal Society and it was placed under the local care of the Royal Cornwall Polytechnic Society. Under a Special Committee of that body the work has been carried on without intermission since March, 1868, an annual grant being contributed for that purpose by the Meteorological Office.

At the close of 1883 negotiations were entered into with the Meteorological Office which resulted in the Royal Cornwall Polytechnic Society providing a new site and erecting buildings for observatory purposes. The new observatory was opened in 1885.

At the instance of several prominent members of the Royal Society opportunity was taken at this juncture to initiate the recording of the terrestrial magnetic elements. A chamber was provided in the basement of the new building for this purpose, and a set of self-recording magnetographs was placed there by the Royal Society, who also provided the necessary instruments for absolute magnetic observation. Regular magnetic records commenced in January, 1887, and from that date the meteorological and magnetic work has been continued without intermission.

In 1901 the Royal Cornwall Polytechnic Society gave notice that they were unable to continue the magnetic work without pecuniary aid, and that it would cease if the aid were not forthcoming.

From that date grants were given by the Royal Society and the British Association.

In view of matters connected both with the finances and the personnel of the Observatory this Committee do not see their way to continue the observations after the close of 1912, and feel it only due to the scientific authorities who have so long and so consistently supported the Falmouth Observatory that they should be at once apprised of the fact.

Your obedient Servant,
WILSON L. FOX,
Honorary Secretary, Observatory Committee of the
Royal Cornwall Polytechnic Society.

The Director,
Meteorological Office.

FALMOUTH METEOROLOGICAL AND MAGNETICAL OBSERVATORY.

The Committee of the Falmouth Observatory respectfully submit the following, amongst other reasons, why it appears to them that upon scientific grounds the Falmouth Observatory should be continued. In the Report of the Grant Administration Committee of the British Association consisting of Sir W. H. Preece (chairman), Dr. W. N. Shaw (secretary), Dr. W. G. Adams, Capt. Creak, Mr. Wilson L. Fox, Dr. R. T. Glazebrook, Professor A. Schuster, Sir A. W. Rücker, and Dr. Charles Chree, allusion is made to several of these points.

As regards Meteorology.

1.—The situation at the extreme South-West of England and the opening of the Channel is one of exceptional meteorological importance.

2.—The Observatory serves the purpose of a central station of reference for meteorological data for the South-West of England.

3.—Continuous records of pressure, temperature, wind, rain, &c., must still be the foundation of future progress in meteorology, and the existence of records over the long period of 43 years is in itself a ground for their permanent maintenance.

As regards Magnetic Work.

4.—The conjunction of Falmouth with Eskdalemuir for the effective representation of the details of the variation of terrestrial magnetic force.

5.—On account of the difference in latitude, the character of the disturbances recorded at the new Observatory at Eskdalemuir is more different than that at Falmouth from the accepted standards of Kew Observatory; therefore, owing to the similarity of latitude, the Falmouth records will be suitable in comparison with those at Kew Observatory for the investigation of secular change.

6.—The position of Falmouth is exceptionally favourable from the magnetic point of view, because it is on the coast in close proximity to the Atlantic Ocean, and therefore affords special facilities for making a connection between the land magnetic surveys and the ocean survey. This has been demonstrated by the visit of the "Carnegie," the magnetic-survey ship of the Carnegie Institution of Washington, which for the purpose of such connection made Falmouth its first port of call.

7.—The problems of terrestrial magnetism, to the solution of which the observatory has contributed its records during the past 24 years, are still engaging the joint investigation of eminent physicists throughout the world. In this connection special data are frequently sought from and furnished by the Falmouth Observatory.

8.—Long before the Kew Observatory was affected by electric trams, the Royal Society felt the importance of supporting the establishment of an additional observatory at Falmouth, by contributing the instruments necessary for continuous photographic records, and for absolute observations.

9.—The scientific value of and necessity for continuity of observations.

NOTE.—The accompanying map shows the important position of the Falmouth Observatory relative to the other magnetic observing stations, situate in or near the British Isles.

Submitted—the following report :—

FALMOUTH OBSERVATORY.

THE Observatory at Falmouth was established for Meteorology in 1868 by the Royal Cornwall Polytechnic Society at the request of the Meteorological Committee of the Royal Society, then in control of the Parliamentary Grant for Meteorology, in pursuance of a proposal of the Royal Society. A subvention of £250 a year was allotted by the Committee to the Polytechnic Society for the maintenance of the Observatory and is still continued.

When a new building was erected in 1885 provision was made for recording magnetic instruments, which were provided by the Government Grant Committee of the Royal Society. Thus, the Polytechnic Society provides the site, buildings, and general administration. The £350 necessary for salaries and maintenance is made up of £250 for Meteorology from the Office, and £100 for Magnetism from the British Association and the Government Grant Committee.

I understand that among the circumstances with regard to the personnel which have caused the Society to give notice of discontinuance is the fact that Mr. Kitto, the Superintendent, will retire at the end of 1912. The financial circumstances are, that £250 a year, with the precarious addition of £100, is not enough to provide for successors to Mr. and Mrs. Kitto, and the Polytechnic Society has no funds available.

The discontinuance of the Observatory makes it necessary for the Office to consider what should be its provision for meteorological work in the south-west. The original purpose of the establishment of the seven observatories of the Kew type in 1868 was to deal with the "daily weather" scientifically. To carry out the purpose at the present day is still a legitimate object for an observatory, but it requires an observer with initiative, who keeps himself closely in touch with the daily weather and the provisions made by the Office for dealing with it. For this purpose photographic recording, and fixed office hours with the routine of 1868, are no longer suitable. For the daily weather the station at Scilly is a more effective "observatory" than Falmouth, and the two ought by this time to have become closely associated for office purposes.

As regards terrestrial magnetism the records are still free from the disturbance of electric tramways, and in that respect the observatory has an advantage over Kew and, presumably, Greenwich. It is, however, close to a high road, and the residential town of Falmouth gradually encroaches. The ground landlord (Lord Kimberley) already takes a rent for keeping neighbouring ground open, so that the site cannot be regarded as permanent in the same way as Eskdalemuir. The advantages of geographical position are undoubted.

Our present line of action is to maintain the recording magnets in continuous operation at Kew in spite of the disturbance by tramways, because we have not yet come to an understanding with the National Physical Laboratory about how magnetic instruments are to be tested, and the magnetic work of the new observatory at Eskdalemuir is an extension of Kew.

In view of the surrender by the Polytechnic Society of the control of the magnetic and meteorological work at Falmouth, it will be necessary for the Committee to review the general policy with regard to magnetism, and with regard to the meteorology of England South-west. If in any case one set of recording instruments has to be surrendered it seems doubtful whether an independent examination, without prejudice, would result in the retention of the disturbed records in preference to those which are at present free from disturbance.

W. N. SHAW.

It was agreed that a report be drafted providing for the discontinuance after due notice of the annual grants to the observatories at Glasgow (£75), Stonyhurst (£56), and Armagh (£50), and for the substitution of two additional telegraphic reporting stations in Scotland.

Staff: Observatories and Instruments Division.—It was agreed that a new draft of duties of the Superintendent of the Instruments Division with a view to the vacancy on 31st March, 1912, be prepared, and report made to the next meeting.

336. *Director's Report and Accounts :—*

International Meteorology.—Reported—the issue of the three following circulars :—

P.02, Circular 4, to the International Meteorological Committee and the Commission for Maritime Meteorology, &c.

INTERNATIONAL METEOROLOGICAL COMMITTEE.

Meteorological Office, South Kensington, London, S.W.,
17th January, 1912.

International Commission for Maritime Meteorology and Storm Warnings.

SIR,

AT the meeting of the International Meteorological Committee at Berlin in 1910 it was resolved that the Commission for Maritime Weather Signals, which was appointed at Paris in 1907, should be reappointed as a permanent Commission for Maritime Meteorology and Storm Warnings (Bericht,

p. 13; Report, p. 14), on the understanding that the Commission would be enlarged to include representatives of all countries interested in Marine Meteorology.

2. I am, therefore, sending this Circular to all members of the International Meteorological Committee, assuming that my colleagues will desire that any member of the Committee who is willing to take part in our deliberations should be co-opted a member of the larger Commission which is now in view.

3. We have to take into further consideration the important question of an international scheme of *night signals* which was referred to us by the International Committee at Berlin. The means to be taken to bring the resolutions of the Commission to the notice of the various Governments concerned, and, reciprocally, the desirability of the Commission being kept officially informed as to the procedure of the various Governments in respect of Maritime Weather Signals, are subjects which also call for consideration.

4. Moreover, the time is now approaching when questions as to the use of observations at sea to amplify the area represented by land observations may properly be brought to the notice of those interested in Maritime Meteorology. Questions on the co-ordination of marine observations with land observations may, therefore, be put forward.

5. It is desirable that a meeting of the Commission should be held in 1912 to discuss these questions and others which may be brought before us.

6. We have, in the first place, to decide as to the time and place at which a meeting may most conveniently be held. I propose that, as in 1909, the meeting should be held in conjunction with that of the Commission for Weather Telegraphy which includes many of our members.

7. In July last, as President of the International Meteorological Committee, I received a communication from the President of the International Institute of Agriculture transmitting a report on Agricultural Meteorology by M. Louis Dop, and asking for a special meeting of the Committee to be convened at Rome in the Spring of 1912 for the official reception of the report and for the transaction of the business incidental thereto. A circular upon this subject will be issued to members of the International Committee. It is sufficient here to say that after correspondence, it has, for various reasons, not been found practicable to hold a special meeting of the Committee at Rome in the Spring of this year.

8. A meeting of the International Commission for Scientific Aeronautics is to be held at Whitsuntide (May 26th or 27th to June 1st or 2nd) at Vienna. Our colleague, Professor Willis Moore, will probably be in Europe about that time. The week following the meeting of the Aeronautical Commission—the first week in June—is therefore the first period to be suggested for our meeting. The alternative would be the second or third week of September (September 9th or 16th).

9. As to the place of meeting, in making inquiries with regard to the proposal for a special meeting of the International Meteorological Committee at Rome the position of Switzerland is evidently convenient in relation to Rome and Vienna, and for the Commission for Weather Telegraphy especially, Berne, as the seat of the International Telegraphic Bureau, seems peculiarly appropriate. I have received from our colleague, Dr. J. Maurer, the assurance of his hearty concurrence if a proposal to hold a meeting in Switzerland should be favourably entertained.

10. On the other hand it would be convenient for the conduct of business, as well as a great pleasure to me as President, if the Commission would meet again, as in 1909, in London.

11. I have, therefore, to ask you to reply to the following questions :—

(i.) If not already a member of the Commission for Maritime Weather Signals, are you willing to be co-opted as a member ?

(ii.) What names do you propose as additional members of the Commission ? (It is suggested, as in the case of the Commission for Weather Telegraphy, that the number of names should be regulated generally by the consideration that the several Bureaux would be willing to send those named as delegates to meetings of the Commission.)

(iii.) Are you in favour of a meeting of the Commission for Maritime Meteorology and Storm Warnings (in conjunction with the Commission for Weather Telegraphy) to be held in Switzerland ?—or in London ?—in the first week of June of this year, following the meeting of the Commission for Scientific Aeronautics ?

(iv.) If a meeting cannot be arranged for June, are you in favour of a meeting being held in London in September of this year ?

12. I have further to ask you to be good enough to send to me as soon as possible any propositions which you wish to bring before the Commission, in order that a provisional programme may be issued not later than 31st March, 1912.

I am, &c.,
W. N. SHAW.

P.03, Circular 4, to the International Meteorological Committee and the Commission for Weather Telegraphy.

INTERNATIONAL METEOROLOGICAL COMMITTEE.

Meteorological Office, South Kensington, London, S.W.
17th January, 1912.

International Commission for Weather Telegraphy.

SIR,

AT the Meeting of the International Meteorological Committee at Berlin in 1910 it was resolved that the Commission for Weather Telegraphy, appointed at Paris in 1907, be reappointed as a permanent Commission (Bericht p. 19, Report p. 20) on the understanding that the Commission would be enlarged to include representatives of all countries interested in questions of Weather Telegraphy including Radiotelegraphy.

2. I am accordingly sending this Circular to all members of the International Meteorological Committee assuming that my Colleagues will desire that any member of the Committee who is willing to take part in our deliberations should be co-opted a member of the larger Commission now in view.

3. A question referred to us by the International Committee is the further consideration of the alteration of the international code that resulted from the substitution of the *barometric tendency* for the reading of the wet bulb. We have accordingly the following items to discuss :—

(i.) The question of three figures or two figures for the barometric tendency in the Continental code.

(ii.) The question of two figures or three figures for the dry bulb reading, and of the introduction of information about the motion of clouds (Professor van Everdingen).

(iii.) The question of the modification of the code for wind direction and force to provide for forces 10, 11, and 12, Beaufort Scale (Deutsche Seewarte).

4. In view of a probable meeting of the International Committee in 1913, it is desirable that a meeting of the Commission should be held in 1912 to discuss these questions and others which may be brought before us.

5. In a circular, corresponding herewith, addressed to the Commission for Maritime Meteorology and Storm Warnings, I have explained that the alternatives before us are a meeting in Switzerland, or in London, in the first week of June, following the meeting of the Aeronautical Commission in Vienna, or a meeting in September which may be in the places named or in some other locality. Beyond noting that it would be convenient for the conduct of business, as well as a great pleasure to me as President, if the Commission would meet again in London, as in 1909, I need not repeat what I have said in the corresponding circular of the Commission for Maritime Meteorology. I may be permitted, therefore, to ask you to reply to the following questions :—

(i) If not already a member of the Commission for Weather Telegraphy, are you willing to be co-opted as a member ?

(ii) What names do you propose as additional members of the Commission ? (It is suggested that the number of names should be regulated generally by the consideration that the several Bureaux would be willing to send those named as delegates to the meetings of the Commission.)

(iii) Are you in favour of a meeting of the Commission for Weather Telegraphy (in conjunction with the Commission for Maritime Meteorology and Storm Warnings) to be held in Switzerland ?—or in London ?—in the first week of June, following the meeting of the Commission for Scientific Aeronautics.

(iv) If a meeting cannot be arranged for June, are you in favour of a meeting being held in London in September ?

I have further to ask you to be good enough to send me as soon as possible any propositions which you wish to bring before the Commission, in order that a provisional programme may be issued not later than March 31st, 1912.

I am, &c.,
W. N. Shaw.

Circular N.S. 7a to the International Meteorological Committee, issued 5th February, 1912.

Comité Météorologique International.

Londres et Berlin,
Janvier, 1912.

Cher Monsieur et très honoré Collègue,

Au mois de Juillet de l'année passée le soussigné Président a recu une communication de M. le Marquis de Cappelli, Président de l'Institut International d'Agriculture, qui désire que le Comité Météorologique International soit saisi officiellement d'un rapport de la troisième Commission de l'Institut sur la question concernant la Météorologie Agricole, rapport approuvé à l'unanimité par l'Assemblée générale de l'Institut. Les propositions de la dite Commission sont celles qui suivent :—

" Le rapport de M. Louis-Dop, sur la question concernant la Météorologie Agricole, sera
" trasmis officiellement par l'Institut International d'Agriculture à M. le Président du Comité
" Météorologique International.

" M. le Président de ce Comité sera prié de réunir ses collègues pour le saisir officielle-
" ment de la demande de l'Institut, demande qui consiste à reprendre le problème de la
" Météorologie agricole déjà étudié dans divers congrès internationaux de Météorologie, et à
" arrêter le programme d'une organisation internationale de Météorologie agricole.

" Ce programme sera ensuite soumis à l'approbation des États adhérents a l'Institut,
" conformément à l'article 9, § f., de la Convention du 7 juin, 1905."

Après avoir reçu cette communication M. Shaw a eu le privilège de s'entretenir avec notre Collègue M. Palazzo qui a proposé verbalement un programme de procédé qui commence par une réunion spéciale de notre Comité à Rome au printemps de 1912.

En vue de l'importance de la météorologie agricole et du grand avantage de la co-operation internationale le Président a fait des démarches pour savoir s'il serait possible de convoquer le Comité pour l'époque désirée. Entre autres difficultés nous avons appris que plusieurs membres du Comité ne peuvent s'absenter avec facilité au printemps que pendant la semaine de Pentecôte et une réunion de la Commission d'Aérostation Scientifique est déjà fixée pour cette même semaine.

Avant de considérer en détail le Rapport que M. Dop a presenté à l'Institut International d'Agriculture il serait recommandable que les membres du Comité et les representants des autres pays préparent un précis du service de météorologie agricole en vigueur dans leurs pays afin que le Comité puisse être mis au courant de la situation actuelle.

Selon l'usage le Comité se réunirait en 1913 ; mais comme les membres viennent de toutes les parties du monde il ne serait pas convenable de les convoquer deux années de suite. Il semble donc que nous ferons des progrès plus sûrs en nous procurant d'abord toutes les informations nécessaires sur un sujet d'une aussi grande importance. De cette façon nous préparerons avec plus de succès la consideration de cette question par le Comité en 1913.

Nous avons donc l'honneur de vous envoyer une copie du Rapport de la troisième Commission de l'Institut International d'Agriculture et de celui de M. Dop.

Nous vous prions en même temps de nous faire parvenir, un resumé succinct des régulations actuelles de votre pays au sujet de la Météorologie Agricole.

Agréez, Monsieur et cher Collègue, nos salutations empressées,

Le Président, W. N. SHAW. — Le Sécretaire, G. HELLMANN.

INSTITUT INTERNATIONAL D'AGRICULTURE.—ASSEMBLÉE GÉNÉRALE DE 1911.

RAPPORT de la IIIme COMMISSION sur la question N. 6 concernant la MÉTÉOROLOGIE AGRICOLE.

LA troisième Commission, après avoir examiné le rapport rédigé par M. Louis-Dop, Vice-Président de l'Institut et Délégué de la France, sur la question concernant le Météorologie Agricole, dans lequel le Comité Permanent propose de soumettre le programme d'études et de recherches préparé par M. Louis-Dop, à l'examen du Comité International Météorologique, qui pourra provoquer une Conférence spéciale chargée d'arrêter le programme d'une organisation internationale de météorologie agricole ;

ayant entendu les remarques de M. Palazzo, Délégué de l'Italie, qui comme chef de service météorologique et membre du susdit Comité International, pense que la réalisation des propositions arrêtées par M. Louis-Dop soit bien possible dans la forme très justement suggérée par M. le rapporteur, et dans le plus bref délai possible ;

ayant aussi entendu les remarques de M. le Président Dabat et de M. de Miklós en appui des propositions de M. Louis Dop ;

a approuvé à l'unanimité les conclusions du rapport de M. Louis-Dop, et par conséquent, la troisième Commission propose à l'Assemblée générale de ratifier les déliberations suivantes :

La rapport de M. Louis-Dop, sur la question concernant la Météorologie Agricole, sera trasmis officiellement par l'Institut International d' Agriculture a M. le Président du Comité Météorologique international.

M. le Président de ce Comité sera prié de réunir ses collègues pour le saisir officiellement de la demande de l'Institut, demande qui consiste à reprendre le problème de la Météorologie agricole déjà étudié dans divers congrès internationaux de Météorologie, et à arrêter le programme d'une organisation internationale de Météorologie agricole.

Ce programme sera ensuite soumis à l'approbation des Etats adhérents à l'Institut, conformément à l'article 9, § f., *de la Convention du* 7 *juin* 1905.

Rome, 17 *Mai* 1911.

Le Rapporteur
PROF. PALAZZO,
Délégué de l'Italie.

[*M. Dop's report is not reprinted here.*]

In connection with the issue of the last circular, as the supply of printed copies of the "Rapport de la IIIme Commission" enclosed with it was insufficient for the 17 members of the International Committee, a typewritten edition had to be prepared, and it transpired that the inclusion of the typewritten copies in the packets necessitated payment of postage at letter rate instead of "printed papers" rate.

Discussions at the Office.—The meetings for discussion were resumed at the Office on Monday, 23rd October, 1911, and have been continued on alternate Mondays.

Lectures.—The Director's course of lectures as Reader in Meteorology in the University of London was commenced on Friday, 19th January, the subject for this year being "The Meteorology of the Globe."

Schuster Readership (Minute 314).—Mr. G. I. Taylor has now recovered from his illness, and after a short holiday in Norway will take up his work at Cambridge on 20th February.

Application was made by letter of 17th January, 1912, for arrangement to be made in accordance with the regulations for the Readership for Mr. Taylor to hold the appointment at Cambridge.

Mr. Taylor has been recommended to take up the subject of the application of Helmholtz's theory of wave-motion between discontinuous layers in the atmosphere, and to prepare a course of lectures for the Michaelmas term of 1912, using Cleveland Abbe's reprints of papers on Dynamical Meteorology as a basis.

Publications.—Weekly Weather Report, Suggested telegrams from Canada (Minute 328).—In reply to an inquiry regarding the cost of a daily message from Canada giving sufficient data for the construction of a satisfactory map of that portion of the North American continent included in the new maps of the Weekly Weather Report, Mr. Stupart writes (M.O. 405/12, Case 520) that the cable company has made an offer to transmit the report at the rate of 12½ cents per word, approximately 1*s.* for two words. This rate is one half that quoted in the Postal Guide. Mr. Stupart suggests a list of 10 Canadian stations with two or three in the United States. Two code words are required for communicating the data for each station. Allowing two words for the address, a message giving information for 14 stations could be sent for 15*s.*

The annual cost of a daily service on these lines would, therefore, be about £270 to £280.

Geophysical memoirs (Minute 330).—Upon inquiry at the Royal Society it transpired that the cost of reprinting as part of Geophysical Memoir, No. 2, Mr. W. H. Dines's paper on Temperatures on the upper air from the Philosophical Transactions "on the usual terms," would work out at £20 9*s.* 6*d.*, less an allowance for paper, the cost of which is estimated by the Stationery Office (M.O. 158) at 15*s.*

Upon further inquiry as to special terms on the same lines as those applicable in the case of the National Physical Laboratory, the following letter has been received :—

Burlington House, London, W.,
31st January, 1912.

DEAR DR. SHAW,

REPLYING to your letter of the 29th instant, it was with especial reference to the demands of the National Physical Laboratory that the last resolution of Council dealing with the price to be charged for private copies was passed. That was fixed in 1906 by Council Minute, of which I enclose you a copy, and when in November, 1910, the Director of the National Physical Laboratory appealed against the terms charged for reprints for the collected researches of the laboratory, the Council resolved that the regulations (having reference to the Minute already referred to) on the subject be not disturbed. I have no power to go outside these decisions; but I admit that the expression "usual terms" employed in the letter I sent to you might create an impression that there is some power of varying the terms. In your case I have no doubt an allowance would be made for the paper if supplied by the Stationery Office, and if you think that the association of the Gassiot Committee, which is a committee of the society, with the Meteorological Office in the work recorded in Geophysical Memoirs could be made the ground for special arrangement with regard to publication of papers in the latter, perhaps you may think it worth while to make a special application to Council.

The decisions of Council, which I have quoted, were taken with the distinct intention of imposing some of the burden of the original cost of papers upon persons (or institutions) who desired a considerable number of copies for their own purposes.

Believe me, &c.,
ROBERT HARRISON.

Dr. W. N. Shaw, F.R.S.

Council Minute, 22nd February, 1906.

3. In pursuance of notice given at the previous meeting of the Council (*see* Minute No. 6, Feb. 15) with regard to the supply of separate prints of authors' papers, it was moved by Prof. Larmor, seconded by the treasurer, and

Resolved—That the number of private copies allowed to any author be restricted to 100, except in special cases, when extra copies may be allowed for payment, at the rate per 100 of one-eighth of the total cost of the typography and illustrations of the paper, in addition to the expenses of striking off the extra numbers required.

It is therefore proposed to print an abstract of the paper, converting the figures into units adopted by the Office, and to redraw the blocks on a more suitable scale for reproduction, with the necessary revision.

Forecasts for Municipal and County Engineers (Minute 320).—Since the last meeting of the Committee letters reporting resolutions in favour of the proposal have been received from—

The Liversedge Urban District Council.
The Spen Valley Literary and Scientific Society.
The Irish County Councils' Officials' Association.
The Institution of Water Engineers.
The Teddington Urban District Council.
The Ruislip-Northwood Urban District Council.
The Corporation of the City of Gloucester.
The Merton Urban District Council.

Harvest Forecasts.—Mr. C. H. Sample has reported (M.O. 370) to the Superintendent of the Forecast Division upon the Spell notifications of 1911, from which it appears that out of 14 notifications sent, 10 were completely effective, and two were bad.

Kew Observatory.—Dr. Chree has reported that on 10th January the vaults of the Kew Observatory had been flooded and the coals and chronometers isolated.

Reports of Work for December, 1911 and January, 1912.—1. *Marine Division.*—Meteorological Tables for Admiralty: For Baltic, Part II., in course of preparation. For China Sea, completed and forwarded. 46 meteorological logs examined; also 215 North Atlantic registers, 111 radio-telegraphy registers, and 43 Indian Ocean registers dealt with on receipt.

Issues of North Atlantic Charts for January and February, 1912, published; issue for March in the press; and issue for April in course of preparation. Indian Ocean Charts for January and February published; issue for March in the press; April Chart in course of preparation.

vii. Daily Synchronous Circumpolar Charts for "Discovery Meteorology, Part II.," October, 1901 to March, 1904, passing through the press; Monthly Charts of Normal Pressure and Air Temperature, and Charts of Mean Pressure and Air Temperature for each of the 30 months, nearing completion; Diagrams of Wind and Gale Frequency for each of the 30 months, ready for press.

The estimated cost, at rates ordinarily charged, of work done for Public Offices, £36 5*s.*

2. *Forecast Division.*—(1) Current work has been kept up to date.

(2) Number of wireless messages received (1) from H.M. Ships, December 5, January 9 ; (2) from ships of the Mercantile Marine, December 414, January 342.

(3) Corrections to Daily Weather Report for December issued.

(4) Forecast Checking completed up to the middle of November. Results summarised up to October.

(5) Wind Frequency Tables prepared up to the middle of December.

(6) Working Charts prepared for binding up to 31st October.

(7) Storm Warning Checking. The results for the second half of 1911 in process of summarising.

(8) Inquiries :—

	Dec.	Jan.
Prepaid Replies	40	26
Other Telegraphic Inquiries	4	10
Wireless Inquiries	—	—
Telephone Inquiries	10	3
Personal Inquiries	1	1

(9) The issue of new maps for the Weekly Weather Report commenced with January.

3. *Statistical and Library Division :—*

British Meteorological and Magnetic Year Book :—

I. Weekly Weather Report. Report for 1911 completed with the exception of the Appendices, and a special Upper Air Supplement. 1912 up to date.

II. Monthly Weather Report up to date.

III. (i.) Daily Readings up to date.
(ii.) Geophysical Journal, August and September, 1911, in the press.

IV. Hourly Readings. Meteorological. September, 1911, in the press.

Library.—Cards prepared for 90 new volumes. 30 volumes prepared for binding.

Inquiries :—

Newspapers	17
Legal	35
Scientific and Commercial	94
Forecasts	3
General	4

Receipts in connection with Inquiries : £12 2*s.* 0*d.*

Averages of earth temperature for 1907–11 for use with the Weekly Weather Report are being prepared. The values were used in the Reports from January 1st, 1912.

Pressure-tube anemograms from the Groyne Lighthouse, South Shields, for three years 1909–11, have been tabulated and returned.

Pressure-tube anemograms (Direction and Velocity) are now received from H.M. Dockyard at Rosyth for tabulation and return. The records for 25th September—30th November, 1911, were tabulated.

The examination of the Observatory returns, checking the measurements of the Sunshine Cards, and tabulation of the rainfall and wind records, was kept up to date.

The curves and tabulations received from the Observatories were satisfactory.

The current work on Colonial returns is kept up to date, and the returns for past years for Malden Island have been summarized.

The correspondence of the division has been increased during the period owing partly to the inclusion of additional stations hitherto in connection with the Royal Meteorological Society, and partly to the changes in the forms for Monthly Returns, and in the Weekly Weather Report.

4. *Instruments Division.*—The usual Admiralty and Office work.

A new minimum thermometer has been sent to Jersey and a maximum thermometer to Spurn Head Station in lieu of two instruments defective.

Boxes were sent to Corington and Welwyn for the return of Meteorographs.

Storm Cones have been renewed at Mevagissey, Peterhead, Musselburgh, Littlehampton, Sennen Cove, Crookhaven, Prawle point, and Goole.

The following were supplied with instruments against repayment :—

Rev. J. S. Begg, Peebles.
J. W. Duncan, Esq.
Mr. C. J. Pybus, York.
J. Sherwin, Esq., Egremont.
W. J. Carter, Esq., New Malden.
Earl of Granard, Newtown Forbes.
Dr. Vigurs, Newquay.
Edinburgh Academy.
A. M. Pitkin, Esq.
Air Battalion, S. Farnborough.
Rosyth Dockyard.
W. W. Holdgate, Esq., Sutton Valence.
O. M. Prouse, Esq., Ilfracombe.

Instruments were sent for exhibition to Birmingham and Cardiff. Four requisitions have been received from the Crown Agents for the Colonies :—Straits, Falkland Islands, and British Guiana (2) ; also two from the Union of South Africa.

Four Colonial requisitions are in hand.

5. *Investigation of the upper air.*—(*Mr. Dines's Report for quarter ended 31st December, 1911*).—The work has been carried on as usual during the quarter.

On October 4th, a kite dived and fell to the ground when it was 5000 feet away. The kite, wire, and instruments were recovered without damage. This is the first mishap that has occurred for two years.

Eight registering balloons were sent up and five recovered.

During November I went to the Scilly Isles at the invitation of Mr. Cave to see some observations that he was making there with pilot balloons.

Publications.—Report for December and January from Clerk of Publications :—

—	December.		January.	
	Received.	Issued.	Received.	Issued.
Daily Weather Report	760	743	760	732
Weekly Weather Report	375	323	375	324
Monthly Weather Report, &c....	525 (Nov.)	436	525 (Dec.)	441
Do. do. (Maps)	25 (Nov.)	2	25 (Dec.)	2
Daily Readings	200 (Oct.)	175	200 (Nov.)	169
Geophysical Journal	325 (May)	26	325 (June–July).	42 T. Page, Jan.–May. 67 (June).
Hourly Readings.—Meteorological.—Kew & Eskdale	375 (July)	9	375 (Aug.)	10
Do. do. Valencia	250 (July)	9	250 (Aug.–Sept.).	10
Monthly Meteorological Charts (Atlantic) ...	600 monthly to Jan. (3).	463	600 monthly to Feb. (2).	432
Monthly Meteorological Charts (Indian) ...	350 (Jan.)	263	350 (Feb.)	298
International Upper Air Observations ...	0	0	0	0
Sixth Annual Report	—	6	—	5
Berlin Report	—	—	475	—
" Forecasting Weather "	—	2	—	1
Cloud Atlas	—	11	—	5
Observer's Handbook (1910)	—	28	—	10
Barometer Manual	—	13	—	19

Receipts from sales at M.O.—December, £6 7*s.* 3*d.* ; January, £4 13*s.* 10*d.*

New publications.—Copies of the Berlin Report have been received ; The " Observer's Handbook," 1911 edition has been sent to the Stationery Office for printing ; Geophysical Memoirs.—Several of the plates have been received in proof from the lithographers ; The Sixth Edition of the Barometer Manual is out of print, and another edition is in preparation.

Observatories.—Kew.—The usual tabulation of curves from self-recording instruments has been carried out and the tabulated meteorological data have been sent weekly to the Office.

The number of absolute observations made during the two months ending on January 27 was—

Magnetic	Declination	12
	Inclination	8
	Horizontal Force	8
Potential Gradient		26
Ebert Apparatus		15
Wilson „		21
Ångström Pyrheliometer		10

Quick runs of the magnetographs were taken on four occasions, completing the programme arranged with Captain Scott's Antarctic Expedition. Conditions seem to have been very quiet.

International cloud observations were made on 10 days.

The list of magnetic character of individual days for the last quarter of 1911 was got out and sent to de Bilt.

We have now received from de Bilt particulars of the quiet days selected for the first nine months of 1911, and the declination and horizontal force curves have now been measured for the quiet days of the first six months.

The values of P and Q for 1911 in the deflection formula for the absolute horizontal force have been calculated. The differences from the previous year are less than usual, and entail a correction of only 1γ to the values published for the horizontal force in the Geophysical Journal.

The value of P— in the two distance deflection formula—calculated by Mr. Cullum for 1911 at Valencia has been checked. The change since the previous year seems larger than usual, and entails a correction of 3γ to the values published in the Geophysical Journal.

The question of the accuracy of the temperature coefficients obtained at Kew for the Eskdalemuir collimator magnet having been raised by Mr. Walker, an investigation was made as to the existence of an appreciable uncompensated temperature effect in the Kew collimator magnet, whose coefficients were determined in the same way as those of the Eskdalemuir magnet. No certain effect was detected from an examination of the absolute observations of the year 1911, which owing to the very high summer temperatures were especially favourable for such an investigation. It is intended, however, to vary the experiment in the case of the next collimator magnet sent for test and see the result.

During the earlier part of January there was some apparently erratic behaviour on the part of the declination magnetograph. This was noticed a few days after a very high tide, which flooded the

cellars, and as a similar phenomenon occurred after a similar flooding in January, 1911, it was presumably due in some way to the flood. The extra number of absolute declination observations made in January was due to this cause.

The list of seismic tremors for the last six months of 1911 has been got out and sent to Prof. Milne. Owing to the large number of minute tremors which Prof. Milne has of late years thought it desirable to record, the labour is now very considerable. We still have the original type of Milne seismograph with about 1 mm. of trace to the minute, and the examination of minute tremors with a view to discriminating between the natural and artificial ones is somewhat trying to the eyes.

The preparation of the Geophysical Journal has been completed up to the end of October, 1911.

Mr. Dobson has been making the ordinary observations with the Ebert and Wilson apparatus. A good many of the observations with the Ebert do not give satisfactory results. Owing to its sensitiveness errors of reading and other uncertainties are too large. At this season the mobility of the ions experiment frequently gives negative results. Mr. Dobson has also been making some experiments—utilising some new appliances of simple design—with a view to seeing how the distance above the ground influences the results obtained with the Ebert and Wilson forms of apparatus.

The Golf Club has made a number of artificial mounds of earth in various parts of the park. Assurance has been secured from the secretary that the operations are now, for the time being, concluded, and no mounds will be formed which will interfere with the park as a site for observation of electrical potential unless at some future time bunkers should be made on the ladies' course.

Eskdalemuir.—Buildings and Grounds.—The S.E. air flue in the Magnet House broke down and is being repaired. Ground is being prepared for planting of trees.

Staff.—Mr. Southerns was allowed leave of absence for the Christmas week.

Meteorology.—Normal work has proceeded. The thermograph clock behaved very badly, and has only been kept going with difficulty. It requires renewal.

Magnetism.—The preparation of 1911 values for press is proceeding. The normal work of daily tabulation has been carried on.

Seismology.—The preparations for the seismographs were completed in December, and all the instruments set going in January. The Galitzin V is very much affected by change of temperature, and we had to stop the radiator. The instrument recorded excellently an earthquake on 24th January. The Wiechert also recorded this, but the Omori did not. The new instruments are as yet without time marks, and this matter ought to receive attention at once.

Electricity.—It was definitely proved in December that the electrometer zero changed with temperature, and in the beginning of January an automatic arrangement for zeros every three hours was made out of a cheap clock belonging to the superintendent. It works very nicely, and the slight loss of trace involved is set off by the increased accuracy obtained.

Accounts.—Reported—that Messrs. Seton, Cardew & Co., after accepting information on the understanding that a fee of £2 2*s.* would be charged for attendance at court to prove the information, had issued a subpœna for attendance at the Clerkenwell County Court of Middlesex, and had subsequently declined to pay more than £1 1*s.*

Mr. Barstow has expressed his willingness to make inquiry of the Treasury Solicitor as to the legal position of the Office in the matter.

Submitted—The following statement:—

	£	*s.*	*d.*
Bank balance on 30th November, 1911	2,831	7	1
Receipts from 1st December, 1911, to 31st January, 1912	5,059	16	1
	7,891	3	2
Cheques drawn from 1st December, 1911, to 31st January, 1912 ...	3,805	10	5
Bank balance on 31st January, 1912	£4,085	12	9

Submitted — The following Statement of Accounts for the Nine Months ending 31st December, 1911:—

Receipts.						Payments.					
1910.				1911.		1910.				1911.	
£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
2,206 14 8	Balance from year 1910–11	—		1,298 16 3		750 0 0	Director...	—		750 0 0	
12,562 10 0	Parliamentary vote..	—		12,637 10 0							
	Observatories:						Office Salaries:				
*411 3 4	Kew	802 10 11				5,531 12 8	Monthly	5,756 3 7			
*750 0 0	Eskdalemuir ...	1,119 15 1				472 4 4	Weekly	495 3 10			
17 10 0	Valencia	17 10 0								16,251 7 5	
				1,939 16 0			Observatories:				
	Departmental Expenses Repaid:					*694 8 10	Kew	1,207 0 11			
						*512 13 4	Eskdalemuir	1,019 7 6			
155 6 2	Forecasts, &c. ...	140 11 2				355 8 8	Valencia	352 0 5			
	Marine, Statistics, and Observatories	85 8 8								2,578 8 10	
59 5 7							Office Expenses:				
23 1 3	Instruments ...	27 11 2				638 0 0	Rent, Fuel, &c. ...	512 12 2			
				253 11 0		314 9 9	Furniture, Fittings, &c.	476 5 9			
	Incidental Expenses Repaid:					238 15 7	Incidental	293 1 8			
256 5 7	Forecasts, &c. ...	258 4 4								1,281 19 7	
45 12 5	Other Branches ...	40 12 0					Postage and Telegrams:				
35 16 8	Stationery Office Account ...	31 7 2				212 10 11	General Postage ...	228 4 3			
				330 3 6		255 10 11	Postage of Daily Weather Reports ...	261 3 11			
	Telegraph Charges Repaid:					1,741 7 0	Telegrams, &c. ...	1,996 17 10			
141 8 7	Home	193 2 10								2,486 6 0	
266 12 7	Telegrams sent abroad	380 1 6				316 4 5	Travelling Expenses and Inspections...	—		230 13 9	
				573 4 4		774 0 0	Superannuation ...	—		1,086 12 0	
	Instruments:						Cost of Instruments:				
—	Royal Navy ...	7 10 0				386 4 3	Royal Navy	314 12 6			
856 2 8	Mercantile Marine, Stations, &c. ...	975 0 1				818 3 2	Mercantile Marine, Stations, &c. ...	1,324 10 7			
				982 10 1						1,639 3 1	
33 0 0	Observatories, &c.:	—		63 14 5			Observatories, &c.:				
	Superannuation Account:						Allowances for other Observatories, Observers, &c. ...	—		1,661 14 10	
423 15 0	Annuities... ...	428 2 6				1,585 7 6					
49 0 6	Interest on Investment	67 11 0				357 9 1	Lectures and Experiments ...	—		227 11 2	
—	Income Tax returned	17 10 0									
				513 3 6		10 5 2	Antarctic Meteorology	—		—	
	Lectures and Experiments ...	—		575 0 1			Balance:				
314 13 2						2,616 6 6	Cash at Bank... ...	879 7 10			
0 0 10	Amount Refunded	—		—		26 11 11	„ at Office ...	44 4 8		923 12 6	
£18,607 19 0				£19,167 9 2		£18,607 19 0				£19,167 9 2	

Liabilities.				Assets.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
2,210 1 7	To sundry creditors	1,741 2 2		2,642 18 5	By cash at Bank and at Office ...	923 12 6	
4 2 10	„ salaries reserved	50 0 0		—	„ superannuation	67 1 3	
494 8 9	„ superannuation	—		461 4 3	„ Admiralty	383 18 6	
1,300 9 3	„ balance	441 2 2		493 5 2	„ M.O. instruments in stock	259 19 9	
				411 14 7	„ sundry debtors	597 12 4	
£4,009 2 5		£2,232 4 4		£4,009 2 5		£2,232 4 4	

Note.—On 31st December the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £2,119 5*s.* 11*d.*

* These figures are for the six months ending 31st December

Observatories.—Statement of Accounts for the nine months ended 31st December, 1911 :—

KEW.

July—Dec., 1910.	*Receipts.*	1911.
£ s. d.		£ s. d.
212 7 4	Gassiot Trust	446 17 11
187 10 0	National Physical Laboratory ...	281 5 0
1 6 0	Grazing Rents	5 0 0
10 0 0	Miscellaneous	69 8 0
283 5 6	To Balance	404 10 0
£694 8 10		£1,207 0 11

July—Dec., 1910.	*Payments.*			1911.
£ s. d.		£ s. d.		£ s. d.
347 5 0	Superintendent			506 10 10
221 2 0	Assistants			304 19 8
—	Caretaker...			61 2 6
6 10 0	Sundays and holidays ...	12 0 0		
17 2 9	Overtime	70 16 6		
				82 16 6
45 8 10	Rent, fuel, and lighting			90 8 1
—	Repairs			1 3 7
15 17 6	Insurance...			—
18 18 10	Materials			41 13 2
—	Instruments			35 19 5
3 14 1	Books, printing, and stationery			29 7 10
18 9 10	Incidental expenses ...			52 19 4
£694 8 10				£1,207 0 11

ESKDALE.

July—Dec., 1910.		1911.
£ s. d.		£ s. d.
750 0 0	Royal Society (Parliamentary Grant)	1,000 0 0
—	Dr. Schuster...	104 9 10
—	Miscellaneous	15 5 3
£750 0 0		£1,119 15 1

July—Dec., 1910.	*Payments.*			1911.
£ s. d		£ s. d.		£ s. d.
200 0 0	Superintendent			300 0 0
115 0 0	Assistants			261 4 2
54 12 0	Mechanic and Caretaker			81 18 0
26 0 0	Handyman			39 0 0
—	Books, stationery, &c. ...			9 19 0
—	Insurance			1 3 8
—	Travelling expenses ...			32 12 9
	Incidental expenses :—			
27 15 0	Rental of private wire	27 15 0		
15 19 8	Instruments and repairs	125 3 1		
8 5 4	Photographic paper ...	38 12 7		
47 10 0	Coals and carriage of coals, light	75 5 10		
2 12 0	Repairs, &c.	—		
15 4 4	Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	26 13 5		
				293 9 11
237 1 8	Balance in hand ...	—		100 7 7
£750 0 0				£1,119 15 1

VALENCIA.

April—Dec., 1910.		1911.
£ s. d.		£ s. d.
17 10 0	Grazing Rent	17 10 0
337 18 8	To Balance	334 10 5
£355 8 8		£352 0 5

April—Sept., 1910.	*Payments.*			1911.
£ s. d.		£ s. d.		£ s. d.
206 5 0	Superintendent			206 5 0
91 10 0	Assistants			92 0 0
—	Rent. rates, and taxes			12 14 1
57 13 8	Miscellaneous expenses			41 1 4
£355 8 8				£352 0 5

FORTY-FIRST MEETING.

South Kensington, S.W., 20th March, 1912.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	MR. MIDDLETON.
SIR G. H. DARWIN.	DR. SCHUSTER.

337. The Minutes (331 336) of the last Meeting (7th February, 1912) were read and confirmed.

338. *New Office.—Furniture.*—The Director reported (1) that the installation of the duplicate printing machine authorised on 2nd November, 1911, was not yet completed. The Office of Works has raised the question whether the Office is prepared to pay the cost of wiring and it has been explained that the Office will meet the cost (£41) unless the Treasury rules it to be included in the tenants' rights under the lease.

(2) That the following items of furniture were still required :—

A table, with shallow glass case over, in the anteroom for the display of publications in lieu of the improvised arrangement on the counter, which leaves the publications exposed to dust and other accidents.

Nests of drawers, with shallow glass cases over, under the window sills of four bays in the Library for the display of rare books, cloud photographs, &c. and the storage of working forms in use and current records for the statistical division.

Additional equipment for the workshop.

(3) That the sum of £61 had been collected by private subscription to defray the cost of the bronze medallions and carved devices in the hall and anteroom.

(4) That a present of a series of photographs of cloud forms had been received from Captain D. Wilson Barker, of H.M. Nautical Training ship "Worcester."

(5) That the daily weather charts from all parts of the world, forming a unique collection, based upon international co-operation commencing in 1858, were not suitably housed on the present shelves in the forecast room, and offered to provide in addition to a table for the use of those who work with the charts a suitable mahogany bookcase to preserve the collection in commemoration of his tenure of the Office of President of the International Meteorological Committee.

The offer was accepted and the Director was authorised to consult the Office of Works as to the design of the book-case.

The question of the provision of the other items was postponed.

339. *Estimates for* 1912–3.—A draft reply to the letter from the Treasury dated 7th February, 1912 (Minute 335) was submitted, and it was agreed that a shorter letter be prepared and sent. The letter as revised in the following form was despatched on 11th April, 1912 :—

SIR, 11th April, 1912.

I AM instructed by the Meteorological Committee to acknowledge the receipt of Sir T. L. Heath's letter (22843/11) of the 7th February, and to ask you to convey to their Lordships the thanks of the Committee for the intimation that the sum of £17,000 will be included in the Estimates as the Grant for Meteorology in the year 1912–13.

2. They note that their Lordships trust that this sum may be made to suffice for subsequent years, and they have accordingly given further careful consideration to the financial position of the Office.

3. The items of expense indicated in their letter of the 11th December, 1911, amount altogether to a sum of £1,353 in excess of the grant as fixed in 1910. Of this sum £726 is estimated to be required for the Observatories, and the remainder for the Office. If the increase of £150 a year is to suffice for future years, £1,200 must be provided either by reduction of expenditure to which they are committed for the current year, or by an equivalent increase of charges for services

rendered. The Committee have given most serious attention to various items of expense, and to the scale of charges for services rendered, which have become established by long use, and they will continue to do so. As at present advised no course of action which they are able to recommend in the direction indicated would lead to the increase in available funds which is necessary for the work.

4. The position is briefly as follows :—The Committee are in possession of large accumulations of material initiated many years ago which ought now to be turned to account for practical purposes. At the same time a new situation is forced upon them by the scientific and practical applications of the new study of the upper air. What has hitherto been treated as hardly more than the productive recreation of enterprising amateurs has rapidly developed into a subject of urgent official inquiry from the point of view of saving life. The Committee have also to deal with the co-ordination of the study of Meteorology with that of Atmospheric Electricity (in respect of which, in relation to weather, claims of a far-reaching character have recently been made by men of scientific eminence), and with those of Magnetism, Seismology, &c., at the observatories. This co-ordination stands on a different footing, so far as the office is concerned, from the natural extension of ordinary Meteorology, but the Committee cannot regard it as of less importance.

5. They feel that in the interests of efficiency and ultimate economy it is proper for the co-ordination to go forward. They recognise that a large amount of new work in Meteorology, with a new kind of staff and equipment, is an indispensable condition for satisfactory progress in aeronautics, for which an extensive official programme has been put forward, and at the same time it is their duty to represent to Their Lordships that they would be ill-advised to break off the continuity of work on the old lines at a time when the accumulation of the necessary material really demands well-considered efforts to develop the practical applications which have been all along the ultimate purpose of the long process of compilation.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W.

340. *Grants for Auxiliary Observatories* (Minute 335).—The following letter intimating to the Observatory of the University of Glasgow that it was proposed to discontinue the grant of £75 per annum and to substitute a telegraphic reporting station was approved :—

SIR, 30th March, 1912.

THE Meteorological Committee have had under consideration the estimate of expenditure of the Office in the coming financial year. They note that in pursuance of an arrangement made by the Meteorological Council in 1883, the sum of £75 per annum has been paid annually to you as Director of the Observatory of the University of Glasgow, in consideration of certain meteorological tracings obtained from the instruments lent by the Meteorological Committee of the Royal Society in 1868, and provision for a like amount is included in the estimate of Office expenses in the year 1912–13.

In the 27 years which have elapsed since the arrangement was made changes have taken place which to a certain extent modify the relative importance of the requirements of the Office, and have led to the conclusion that the Office ought to obtain additional reports by telegraph from Scotland, and also to make provision for systematic reports of observations in the upper air, in order, first, to follow out the application to the practical purposes of "forecasting" of the results of recent researches, and secondly, as far as possible to meet the immediate requirements of Government and private persons in respect of information for the use of aeronauts.

The funds at the disposal of the Committee do not permit them to take up the new work thus indicated, and at the same time to maintain in full the customary work on the old lines. Judging that the purpose which the Meteorological Committee of the Royal Society had in view in establishing in 1868 a meteorological observatory of the Kew type at Glasgow may now be regarded as partially fulfilled, they are led to the conclusion that they must reduce their expenses by discontinuing the grant mentioned.

So far as regards the year ending 31st March, 1913, provision has already been made, but the Committee wish to regard themselves as free to make the reduction in the year beginning with 1st April, 1913.

In the meantime the Committee hope to arrange for a telegraphic reporting station in the West of Scotland. Although, having regard to the importance of wind as a meteorological element, it is usual to select stations with more ample exposure, Glasgow would be in many ways a suitable situation, and the Committee would be glad to know whether any one connected with the Observatory would be willing to take up the duties of observer. Telegrams would be required for the 7 a.m. and 6 p.m. observations.

The usual terms of payment of a telegraphic observer are set out in the Circular of which a copy is enclosed.

I am, &c.,
W. N. SHAW.

Professor L. Becker, Ph.D.,
The Observatory,
Glasgow.

It was agreed to send a corresponding letter to Stonyhurst observatory without the offer of the substitution of a telegraphic reporting station.

The question of the grant to Armagh was postponed.

341. *Appointments.—Superintendent of the Instruments Division.*—The Director was authorised to make further inquiries as to suitable candidates for the post which will become vacant on 31st March, on the basis of the following memorandum :—

METEOROLOGICAL OFFICE.

APPOINTMENT OF SUPERINTENDENT OF THE INSTRUMENTS DIVISION.

The Meteorological Committee are prepared to appoint a Superintendent of the Instruments Division as from 1st April, 1912.

The duties are to advise and assist the Director with regard to the following :—

1. The maintenance of all instruments in use at the Office in good working order and repair.
2. The organisation (in conjunction with the Superintendents of the other divisions) and the supervision of the "corps of observers" at the Office.

The corps of observers consists of 12 members of the junior staff of all divisions who attend to the self-recording instruments and make the requisite eye-observations. The instruments at present installed include, barographs, thermographs (electrical and mechanical), hyetograph, electrical radiation recorder, pressure tube, anemograph, sunshine recorder, nephoscope and the usual equipment of a station of the second order. Systematic analysis of the air is contemplated.

3. The improvement of instruments used by the Office or provided by the Office for use at Observatories, Stations or elsewhere.
4. Experimental researches in connexion with the improvement of instruments or the introduction of new instruments or observations at the Office, the Observatories or elsewhere.
5. The organisation (in conjunction with the Superintendents of the other divisions and of the observatories) of co-operation between the staffs of the Observatories and the Office.
6. The preliminary examination of the records, tabulations, &c. from the Observatories and the self-recording instruments in connexion with the Office, to ascertain that the apparatus is in working order.
7. The inspection of observatories and stations.
8. The selection and preparation of exhibits of diagrams, instruments, &c. in the Office Museum or at public exhibitions.
9. The supply of instruments to the Royal Navy on the requisition of the Admiralty, to the Mercantile Marine on the requisition of the Marine Superintendent, to the Dominions and Colonies on the requisition of the High Commissioners, the Agents General or the Crown Agents, and to Observatories and stations in connexion with the Office.
10. Such other duties as the Director may assign.

Four rooms at the Office are assigned to the division, viz : the superintendent's room, which has some laboratory appliances, a clerk's room, a small workshop, and a small laboratory with photographic rooms attached. The laboratory is in direct communication with the Office roof where there are facilities for experimental work in the open air.

The present staff of the division is as follows :—

Assistant—2nd Class Clerk—(£175–£200 a year).
Boy Clerk—(£50 a year).
Mechanic—(£125–£150 a year).
A Laboratory Boy—(£30 a year).

The Director's photographic assistant uses the Laboratory and Photographic rooms for the preparation of Lantern slides, Diagrams for illustrating publications and lectures, models, &c. This work would be associated in some way with that of the Division.

The staff of the Division also provides assistance for lectures, &c. either at the Office or elsewhere.

To the present staff may be added from time to time one or more graduate assistants engaged in research or in training for employment at the Observatories or Colonial Offices.

The hours of attendance are six hours a day at the Office as directed. Elsewhere as directed. The superintendent will be expected to spend some time each year at the Observatories and to take up or provide for emergency duty there if necessary. During his absence the division will be in charge of the Director and his personal Assistant.

The holidays are six weeks in the year in addition to the usual fixed holidays. They must be arranged on the understanding that it is inconvenient for the Director and the Superintendent both to be absent from the Office together.

The tenure of the Office is terminable by twelve months notice on either side.

Salary—£350—£12. 10*s*.—£450, of which not less than 10 per cent. is to be reserved for endowment assurance in lieu of pension.

Meteorologist for the Branch Office at South Farnborough.—On the nomination of the Director Mr. J. S. Dines was reappointed for one year at a salary of £225.

Statistical Division.—The Director reported that Mr. A. J. Rigby had been absent for 23 days on sick leave between 10th November and 6th December and subsequently had been unable to attend at the Office since 24th January. As the absence fell at the time of the increase of work due to taking over the stations of the Royal Meteorological Society the work of the Statistical Division had fallen into arrear, and the staff of the

division had been allowed to work overtime in order to complete the Monthly Report for January at a cost of £5 12*s*.

In view of the fact that Mr. Rigby reaches the age of 65 years on 8th August, 1912, it was agreed that steps be taken to make arrangements in anticipation of his retirement in case he is unable to take up his duty.

342. *Director's Report and Accounts* :—

Evening Reports from Health Resorts.—The circular letter approved at the last meeting of the Committee (Minute 334) suggesting compulsory annual inspection at a charge of £4 for all stations from which reports are received for circulation to newspapers was sent out on 1st March.

Up to the present, three places

Eastbourne,
Southsea,
Stonehaven,

have intimated that they are prepared to adopt the scheme.

From other stations formal acknowledgments, stating that the scheme would be brought before the council or other responsible authority at an early date have been received. In a few cases further particulars have been asked for.

No definite refusals to adopt the scheme have been received as yet.

Reports and Forecasts for H.M. Ships in Home Waters by Radiotelegraphy.—A letter (M.O. 647) had been received from the Admiralty stating that the reports prepared each evening for transmission by wireless telegraphy to H.M. ships have been much appreciated by H.M. ships, and asking for arrangements to be made for the issue, in addition, of a similar report, based on the 7 a.m. observations, by 9.30 a.m. Arrangements have been made accordingly and the service began on 1st March.

Reports of Work for February, 1912.—1. *Marine Division.*—Meteorological Tables for Admiralty: for Baltic, Part II., in course of completion; for China Sea, Part III., in course of preparation.

23 meteorological log books examined; also 92 North Atlantic registers, 41 radiotelegraphy registers, and 19 Indian Ocean registers, dealt with on receipt.

Issue of North Atlantic Chart for March, 1912, published; issue for April in the press; and issue for May in course of preparation. Indian Ocean Charts for March, 1912, published; April in the press; and May in course of preparation.

vii. Daily Synchronous Circumpolar Charts for "Discovery Meteorology, Part II.," October, 1901, to March, 1904, passing through the press; Monthly Charts in course of completion or passing through the press.

The estimated cost, at rates ordinarily charged, of work done for Public Offices, £18 15*s*.

2. *Forecast Division.*—(1) Current work has been kept up to date.

(2) Number of wireless messages received during February has been (1) from H.M. Ships, 9; (2) from ships of the Mercantile Marine, 303.

(3) Corrections to Daily Weather Report for January issued.

(4) Forecast Checking completed up to the end of November. Results summarised up to October.

(5) Wind Frequency Tables prepared up to the end of December.

(6) Working Charts prepared for binding up to 18th November.

(7) Storm Warning Checking. The results for the second half of 1911 in process of summarising.

(8) Inquiries :—

Prepaid Replies	49
Other Telegraphic Inquiries	12
Wireless Inquiries	—
Telephone Inquiries	6
Personal Inquiries	1

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book. Parts I. and II. up to date. Part III., section i., volume for 1911 completed; Part III., section ii., copy for September, 1911, with printer. Part IV., Meteorological Values for October (Valencia and Kew) and for September (Eskdale) passed for press.

The examination of the Observatory Records, and Sunshine Cards, and the tabulation of Cup Anemograms has been kept up to date.

Library. 35 cards prepared for catalogue, 231 volumes for binding. Inquiries as follows :— Newspapers, 5; Legal, 14; Scientific and Commercial, 49; Forecasts, 1; General, 1. The receipts in connexion with these amounted to £15 15*s*. 6*d*.

4. *Instruments Division.*—The usual Admiralty and Office Work.

One box was sent for the return of a Meteorograph found at Bognor.

The following were supplied with instruments against repayment :—

Chopwellwood College.
E. Heron-Allen, Esq.
W. W. Tunnicliffe, Esq.
Earl of Granard, Castle Forbes.
J. Firth, Esq.
Aspatria College.
Mrs. C. Lyndon.

One requisition was received from the Crown Agents for the Colonies, viz., Hong Kong. Also one from the Commonwealth of Australia for instruments at an estimated cost of £1,481.

Three Colonial requisitions are still in hand.

Publications.—Report for February from Clerk of Publications :—

—	Received.	Issued.
Daily Weather Report	760	753
Weekly Weather Report	375	325
Monthly Weather Report, &c.	—	—
Do. do. (Maps)	—	—
Daily Readings	200 (Dec.)	174
Geophysical Journal	325 (July)	67
Hourly Readings.—Meteorological.—Kew	375 (Sept.)	10
Eskdale ...	—	—
Valencia ...	—	—
Monthly Meteorological Charts (Atlantic)	600 monthly to March (3)	523
Monthly Meteorological Charts (Indian)	350 (March)	259
International Upper Air Observations	50 (Dec., '09)	30
Sixth Annual Report	—	3
Berlin Report	—	219
"Forecasting Weather"	13	1
Cloud Atlas	—	2
Observer's Handbook (1909)	—	1
Do. do. (1910)	—	2
Barometer Manual	—	4

Receipts from sales at M.O.—£2 1*s.* 7*d.*

New publications.—The final proof of the "Observer's Handbook," 1911 edition, has been sent to the Stationery Office ; Geophysical Memoirs.—All the plates have been received in proof from the lithographers ; proof of the text of No. 1 and part of No. 2 has been received.

M. O. Press.—During the two months ended 29th February, 1912, the issue of the Periodical Publications has been as follows, namely :—

Daily Weather Report.—As contract, except on five occasions when the machine broke down.
Weekly Weather Report.—As contract.
Monthly Weather Report.—Nil.
Monthly Meteorological Charts, North Atlantic.—As contract.
" " " Indian Ocean.—As contract.

On 1st January, 1912, there were two requisitions for forms, &c., outstanding. Since that date nine requisitions have been issued and six discharged, leaving five requisitions still in hand.

The new printing machine has been delivered and partially set up. H.M. Office of Works has provided new cables to supply the current required for the second machine, but the machine is not yet running.

Observatories.—Kew.—The barograph, thermograph, anemograph (Robinson Cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the office.

The following absolute observations have been made :—

Magnetic	Declination	4
	Inclination	4
	Horizontal Force	4
Potential Gradient	on	19 days.
Ebert Apparatus	"	6 "
Wilson "	"	7 "
Ångström Pyrheliometer	"	3 "

International cloud observations were made on three days.

Scale value determinations have been made of the electrograph, the seismograph and the horizontal and vertical force magnetographs.

The preparation of the November data for the Geophysical Journal has been completed.

Photographic paper has been supplied to Eskdalemuir, Hong Kong and the India Office (for Indian observatories).

A commencement has been made of the repairs to the road undertaken by H.M. Office of Works.

During the severe frost more trouble than usual was experienced from the freezing of the electrograph jet, leading to some loss of trace.

The caretaker and his wife have suffered successively from influenza—requiring some little extra assistance—but have now recovered.

Eskdalemuir.—Grounds.—The piece in front of the buildings has been prepared and the young trees were delivered on 24th inst.

The intense frost during the first week led to trouble in many directions. We were frozen out of the gas house. I have reported to the architect, and the engineer promises to visit the place soon and examine the boiler.

Meteorology.—The normal observations have been made.

Magnetism.—The absolute observations were made under great difficulty, the temperature on one occasion being — 2° C. The circle seemed to be very severely strained, otherwise work has proceeded as usual, and the tabulation of results for last year are making good progress. The new V.F. recorder has just been set up in the magnet house.

Seismology.—Time marks have been introduced on the Galitzin V recorder. The multiplying arrangement on the Omori has been removed, and we are trying a device shown to me by Dr. Milne some time ago.

Electricity.—Here also the frost gave much trouble. The jet froze on the 2nd and in spite of great efforts we could only get it to run for a few hours. A new tube was put in, but only on the 7th did we succeed in getting the apparatus properly started again.

Accounts.—Endowment Assurance.—Reported—That £60 had been paid to the Sun Life Assurance Society as the special and first quarterly premiums for securing to Mr. Lempfert a Sinking Fund Assurance of £1,498 to mature on 31st January, 1936. In accordance with Minute 330.

Sale of Old Zinc.—Reported—That the zinc blocks containing preliminary engravings of the observatory records for 1869–1880, and used for the preparation of the copper plates, now stored at Malby & Sons, from which the plates of the Quarterly Weather Report were printed, had been sold on 29th January, 1912, to J. H. Robinson, 91, Globe Road, E., at the rate of £21 per ton. The total weight of zinc was 2 tons 4 cwt. 2 qrs. 11 lbs., and the amount received from the sale was £46 16*s.* 7*d.* (M.O. 300).

Harmonic Analyser.—Sir G. Darwin suggested a possible purchaser of the Harmonic Analyser, and it was agreed, subject to the consent of the Treasury, to accept £200 for it.

Submitted—The following statement:

	£	*s.*	*d.*
Bank balance on 31st January, 1912	4,085	12	9
Receipts from 1st to 29th February	113	18	7
	4,199	11	4
Cheques drawn from 1st to 29th February	1,902	8	0
Bank balance on 29th February	2,297	3	4

1912–1913.

(Eighth year of the Meteorological Committee.)

FORTY-SECOND MEETING.

South Kensington, S.W., 1st May, 1912.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

SIR G. H. DARWIN. | THE HYDROGRAPHER.
CAPTAIN HARVEY. | MR. MIDDLETON.
DR. SCHUSTER.

343. The Minutes (337–342) of the last Meeting (20th March, 1912) were read and confirmed.

344. *New Office.—Priority for Meteorological Telegrams* (Minute 332).—The special form for use in connexion with the storm warning service has been approved by the Post Office, and it is now in the printers' hands, signed for press.

Our regular messages have now enjoyed priority for rather over a month. During the last fortnight there has been a distinct improvement in the service, especially as regards home messages.

Post Office Charges (Minute 313).—Read—the following letter :—

No. 295255—11. (M.O. 1,501.)

General Post Office, London,
30th April, 1912.

SIR,

YOUR letter of the 21st September last, setting forth the objections of the Meteorological Office to renting a private telegraph wire between that Office and the Central Telegraph Office, has been carefully considered.

The Postmaster General fears that communication with the Central Telegraph Office about the transmission of meteorological telegrams could not be satisfactorily conducted through the staff of the South Kensington Office ; moreover there is no telephone set near the South Kensington circuit at the Central Telegraph Office.

The Postmaster General suggests, as a way out of the difficulty, the provision of one or more telephone circuits from the Meteorological Office to the Central Telegraph Office over which direct communication could be made. The whole of the meteorological telegrams now sent to and from South Kensington and the Central Telegraph Office, it is considered, should be carried, without delay, by two telephone circuits ; and by the provision of telephones the objection to the employment of a special staff for manipulative work at the Meteorological Office would be removed.

The rent of two telephone circuits would be approximately £43 a year as against £75 a year for two telegraph circuits fitted with printers.

The estimated cost of attendance at the Central Telegraph Office would be between £40 and £50 a circuit. No charge for telegraphists' services at the Central Telegraph Office was made in connexion with the private telegraph wire formerly rented by the Meteorological Office, but it will be necessary to obtain the sanction of the Treasury before such charges can be waived in respect of telephone circuits.

There is another matter which has an important and direct bearing on the question of the Meteorological Office renting a private telegraph wire or telephone circuits. Weather reports are received daily by telegraph from foreign observation stations ; and it is understood that, by arrangements with the foreign administrations concerned, these telegrams have been transmitted to this country free of charge. When the Meteorological Office rented a private telegraph wire the telegrams were re-signalled at the Central Telegraph Office over that wire, but since the private wire was given up they have been forwarded to South Kensington over the public wires ; and payment at the ordinary inland rate for their transmission from the Central Telegraph Office will now be required. It is estimated that the value of the inward foreign telegrams forwarded to the Meteorological Office in respect of which no credit is received by the Post Office either from the Foreign

Administrations concerned or from the Meteorological Office is approximately £400 a year. No difficulty would be found in delivering these telegrams by telephone from the Central Telegraph Office to the Meteorological Office.

The position may be shown thus :—

Present yearly payments in force and proposed if Private Wires or Telephone Circuits be not rented.	£	Yearly payments under proposed Telephone Circuits.	£
Special attendance at South Kensington Branch Office (approximately) ...	72	Rent of Two Telephone Circuits ...	43
Cost of transmission of Foreign Weather Reports	400	Cost of attendance at Central Telegraph Office, say	90
	£472		£133
Plus cost of service messages.			

A saving to the Meteorological Office, if two telephone circuits be rented and the cost of the telegrams be charged to that Office, of over £340 a year, or, if Treasury authority be granted for waiving the cost of attendance at the Central Telegraph Office, of at least £430 a year.

No sum has yet been charged through the accounts of the Cable Companies or against the Meteorological Office in respect of the transmission of the foreign weather reports referred to; and the Postmaster General will be glad to know, as soon as possible, if in the altered circumstances the Meteorological Office will now be prepared to rent two private wires or as an alternative to rent two telephone circuits.

The charge for special attendance at the South Kensington Branch Office was at first at the rate of £73 1*s.* a year, but through an alteration in staffing arrangements the charge was reduced to £72 in April last. An adjustment will be made in the next account rendered to the Meteorological Office.

I am, &c.,
A. M. OGILVIE.

The Director,
Meteorological Office.

Read also—the following report from the Superintendent of the Forecast Division :—

It is hardly fair to speak of the two telephones as a "saving" to M.O. It simply comes to refraining from charging us £400 more than at present.

For convenience of working I much prefer the present arrangement of the tube. The present staff could not get the Daily Weather Report transfer prepared by 11 a.m. if they had to take down the messages in addition to their present work. It would be necessary to have at least one if not both of the 9 a.m. staff on duty by 7.15 a.m. The work has increased considerably since we left 63, Victoria Street. There are now more wireless messages, the maps take longer to draw, the preparation of maps, &c. for the Park and the acceptance of the London observations from Greenwich, &c. all occupy the staff. The work for the Admiralty has also increased.

The addition to the noise in the room made by two people talking through telephones is a disadvantage.

I would suggest that we register two telegraphic addresses. "Weather London" for forecast inquiries, reports from health resorts, &c. for which no priority is claimed. These to continue to come through South Kensington Post Office and to be delivered by tube.

The second telegraphic address would be used for all our official messages and for storm warning telegrams.

With this modification the present evening staff could cope with the work if transmission by telephone is adopted.

The Director was requested to prepare a reply.

Furniture (Minute 338).—Reported—that in reply to the request of the Office, drawings for the proposed bookcase had been prepared by Mr. R. J. Allison of the Office of Works, and were now under consideration as regards accommodation.

M.O. Press (Minutes 313, 325, 332).—Reported—that the second machine authorised on 1st November, 1911, was now installed and in use for printing the daily reports.

345. *Grants for Auxiliary Observatories.*—Read—the following replies to the letters of Minute 340 :—

M.O. 1,293 (C. 39).

The Observatory, Glasgow,
12th April, 1912.

DEAR SIR,

I AM in receipt of your letter of 30th March and note that the grant of £75 which has been paid annually to this Observatory since 1886 will be discontinued on 1st April, 1913.

I beg to mention that the observations obtained in the 40 years 1868–1907 with your instruments have been discussed and that the manuscript has been ready for the press since 1908. In addition to

tables giving monthly means of temperature, &c. the manuscript gives similar compilations for each period of five days and many statistical tables.

I expect that I shall soon have sufficient money at my disposal to publish these results. Considering that 44 years are now available, tables have been kept up to date, and that 50 years of observations would be completed in December, 1917, I shall be glad to know whether the instruments installed by the Meteorological Committee in 1868 may remain here until December, 1917, without any obligation on our part to supply you with copies of records or monthly compilations. In case of a favourable reply I should apply to the city authorities for a grant to complete the 50 years' records.

Referring to your enquiry regarding a telegraphic reporting station, I regret to say that mine and my assistants' duties at the astronomical observatory make it impossible for us to undertake the observations at 7 a.m.

Yours faithfully,
L. BECKER.

The Director,
Meteorological Office, London.

M.O. 1,193 (C. 39).

Stonyhurst College, Blackburn,
1st April, 1912.

DEAR SIR,

I AM obliged by your letter this morning giving timely notice of our future disconnection. This, if I read rightly, does not occur until March next.

Enclosure also received duly.

Yours faithfully,
W. SIDGREAVES, S.J.

It was agreed to allow the instruments to remain and to ask for a monthly summary.

346. *Seventh Annual Report.*—It was agreed that the report be prepared for the past year on the same lines as in previous years.

347. *Meteorological Office Observatories.—Eskdalemuir* :—

Meteorological Office Observatories: Eskdalemuir.—The Director reported that on 10th April he had received an informal letter from the Superintendent asking for the dismissal of the mechanic-caretaker (whose wife is housekeeper for the assistants) on the ground of his having absented himself without leave on 8th April (English Bank Holiday) and subsequent insubordination, and suggesting discussion of the matter during an official visit of the Director to the Observatory projected for the week of 15th to 20th April. A second informal letter had been received on 13th April stating that in future Mrs. Walker intended to give up employing a regular servant for the house, which includes the two guest rooms, and suggesting that the maidservant then employed there would be available as housekeeper in the caretaker's house, for a bachelor mechanic-caretaker and the assistants. The Director reported further that the primary condition for the working of the Observatory laid down by the National Physical Laboratory, viz. : "That the Superintendent of the Observatory Department should remain in charge of the magnetic work of the two observatories" had become a "dead letter" because direct communication between the Superintendents of the two observatories had practically ceased, and any discussion on matters connected with the magnetic work was carried on by letters addressed by either side to the Office. In view of the general disorganisation of the scheme of administration of the Observatory the Official visit projected for the week of 15th to 20th April had been abandoned, but informal visits had been paid to the Observatory on 17th and 18th April and it may be understood that the letters received on 10th and 13th April express the considered views of the Superintendent on the questions raised.

It was agreed : (i) That having regard to the Superintendent's request and to the difficulties with respect to the available accommodation which have arisen from time to time, action in conformity with the Superintendent's request be authorised by Director's Order, subject to the approval by order of the terms of appointment of a new mechanic-caretaker and new housekeeper (preferably but not necessarily man and wife) with revised arrangements for board and attendance upon the assistants, designed to secure all available facilities for accommodation of the present or future staff.

(ii) That a report be presented to the Gassiot Committee calling attention to the breakdown in the working of the scheme laid down by the National Physical Laboratory, and asking for the views of the Gassiot Committee upon alternatives suggested for bringing the scheme into working order.

348. *Appointments* (Minute 341).—The appointment of a Superintendent of the Instruments Division was postponed.

The promotion of Mr. A. H. Bell to the second class clerkship vacant by the promotion of Mr. Sargeant was approved. (Order 196.)

349. *Stations under Local Authorities.*—Read—the following letter :—

M.O. 1399 (314).

Local Government Board,
Whitehall, S.W.,
22nd April, 1912.

SIR,

I AM directed by the Local Government Board to advert to your letter of the 7th February last (Reference Number 372) as to the power of local authorities to spend money on establishing and maintaining climatological stations and for obtaining information from the Meteorological Office.

In reply I am to remind you that local government authorities are statutory bodies and that as such they are only entitled to spend money in exercising and fulfilling those powers and duties which are by Statute conferred and imposed upon them.

Whether or not a local authority would be justified in incurring expenditure in establishing and maintaining a climatological station would seem to the Board to depend on the character of the observations taken and the use for which they are rendered available. The Board's general view is that it is competent for a local authority to incur expenditure when it is shown to be necessary for the purpose of obtaining information as to influences likely to affect the public health, and thus enabling the Medical Officer of Health to discharge with greater efficiency the duties pertaining to his office.

I am to add that in every case where the accounts of the authority are subject to audit by a District Auditor any expenditure in the matter must come before the Auditor to determine its legality and reasonableness upon the facts of the case. An appeal may be made to the Board against the decision the validity of which the Board are then empowered to determine.

I am, &c.,
WALTER T. JERRED,
Assistant Secretary.

350. *Daily Weather Service.—Station in N.W. Ireland* (Minute 327).—After consideration of reports of inspectors as to the comparative advantages of a Station at Blacksod and at Malaranny it was agreed to ask the Post Office to open the Blacksod post office for the transmission of the messages at 7.15 a.m. G.M.T.

351. *Director's Report and Accounts* :—

International Meteorology (Minute 336).—An invitation has been issued for meetings of the Commissions for Maritime Meteorology and Storm Warnings and for Weather Telegraphy, to be held in London in the week beginning 16th September.

A meeting of the Commission for Scientific Aeronautics is to be held in Vienna in Whitsun week, and it is proposed that the Director should attend.

Schuster Readership.—The following letters have been received :—

M.O. 661 (D. 35).

St. John's College Lodge,
Cambridge,
14th February, 1912.

DEAR DR. SHAW,

I HAVE been some time in answering your letter of the 17th January with regard to the Readership in Dynamical Meteorology. The reason being that I have been trying to arrange something definite before writing.

What happened in Mr. Gold's case was I believe that his name and the title of the Readership was inserted among the list of "University Officers, &c.," among the Readers with a note that it was not a University appointment.

As you know, the office of Reader, when it is a University appointment, carries with it the tenure of a Fellowship and the footnote was an intimation to the Colleges that the Readership in Mr. Gold's case did not confer this tenure.

I have seen Dr. Hobson, who is Chairman of the special Board for Mathematics, and I gather that if Mr. G. I. Taylor applies to the Board to have his Lectures recognised there will be no difficulty in obtaining recognition.

I suggested to Dr. Hobson, that the announcement of Mr. Taylor's lectures should include a statement that he is Reader in Dynamical Meteorology, or is the Meteorological Committee's Reader in Dynamical Meteorology.

This suggestion will have to be confirmed by the special Board for Mathematics, but of this I have every hope.

We all recognise the advantage it is to the University to have the Reader in residence amongst us and are glad to think that the choice of the Committee has again fallen on a Cambridge man.

Any difficulties are purely technical and formal.

Yours sincerely,
R. F. SCOTT,
Vice-Chancellor.

Dr. W. N. Shaw.

M.O. 1,528.

Trinity College,
Cambridge,
27th April, 1912.

WHEN I began working on horizontal waves in the atmosphere I thought I should be able to find mathematical papers which I could adapt to my requirements and that I should be able to apply your data quite soon. I began to suspect that the subject was rather more difficult than I had imagined when I was unable to find a single paper on waves in media in which the horizontal velocity varies continuously with the height.

I asked my friend Mr. Littlewood to write to Prof. Lamb, who is the authority on the subject, and to ask him whether he knew of any papers. Apparently he knew of none, so I have had to start from the beginning. So far the only result I have got which seems to bear on the subject is the following :

If there are three incompressible liquids of density ρ_A, ρ_B, ρ_C such that $\rho_A > \rho_B > \rho_C$, *i.e.* ρ_C on top, and if ρ_C moves with velocity V_C and ρ_A with velocity V_A, while the velocity of ρ_B varies continuously from V_A to V_C, it is possible to find length of the wave produced. The extraordinary thing about it

is that even if the middle fluid B is very thin, it has a finite effect on the wave length. I was so surprised at this result that I took considerable pains to find out a mistake, but so far I have been unable to do so.

The chief difficulty in dealing with waves at the boundary of two fluids which have relative motion is that an infinite number of different wave lengths are possible, and one has to choose the one which gives the minimum energy to the system.

Unfortunately the first order term in the expression for the energy of the system is zero. One therefore has to proceed to the second order which of course involves a wave which is not a sine curve but has a crest sharper than its trough.

These considerations lead me to expect that it will be some time before I shall be able to apply my equations to actual cases in Meteorology, though I think I can apply them to determine the point at which instability sets in in the particular case of laminar motion of a viscous fluid. I therefore return your photographs and papers with many thanks.

I expect I shall go up to town sometime soon to read Assmann and Hergesell's "Beiträge zur Physik der freien Atmosphäre" which you have in your Office. . . .

G. I. TAYLOR.

Supply of Instruments to H.M. Ships.—Reported—letter M.O. 1,279 from the Admiralty requesting that quarterly statements of stocks and proposals to purchase meteorological instruments should be forwarded in future to the Director of Stores, instead of to the Hydrographer; and intimating that the quarterly returns from dockyards will in future be transmitted by the Director of Stores.

Exhibits.—Reported—that on the occasion of the Solar eclipse on April 17th, Callendar records of radiation and temperature had been taken at the office with a time-scale twelve times as open as usual during the greater part of the period of eclipse, and that these records with those of sunshine and pressure had been exhibited at the evening meeting of the Royal Institution, on Friday, April 26th, by request of the Managers.

Reports of Work for March and April.—1. *Marine Division.*—Meteorological Tables for Admiralty:—Baltic, part II., completed and forwarded; China Sea, part III., Eastern Archipelago, part II., and Mediterranean, part I., in course of completion.

Fifty-four new Meteorological Logbooks and two Lighthouse Registers examined; also 203 North Atlantic Registers, 104 Radio-telegraphy Registers, and 43 Indian Ocean Registers, dealt with on receipt.

Issue of North Atlantic Chart for May, 1912, published; issue for June in the press; issue for July in course of preparation.

vii. Monthly circumpolar charts for "Discovery Meteorology, Part II.," October 1901, to March, 1904, passing through the press.

Extraction of observations relating to the Yellow Sea.

The estimated cost, at rates ordinarily charged, of work done for Public Offices, £38 12s. 6d.

2. *Forecast Division, March and April.*—(1) Current work has been kept up to date.

(2) Number of wireless messages received has been (1) from H.M. Ships, March—10, April—5. (2) from ships of the Mercantile Marine, March—370, April—419.

(3) Corrections to Daily Weather Report for March issued.

(4) Forecast Checking completed up to the end of January.

(5) Wind Frequency Tables prepared up to the end of February. March in hand.

(6) Working Charts prepared for binding up to 18th January.

(7) Inquiries:—

	March.	April.
Prepaid Replies	26	7
Other Telegraphic Inquiries	—	9
Wireless Inquiries	—	—
Telephone Inquiries	—	2
Personal Inquiries	—	1

(8) The usual summaries of the results of storm warning and forecast checking have been prepared for the annual report.

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book. Parts I. and II. up to date. Part III., section i., January passed for press, February sent to printer; Part III., section ii., copy for September, 1911, issued; October and November with printer. Part IV., Meteorological Values for November (Valencia, Eskdale and Kew) passed for press. Copy for December (Valencia and Kew) sent to printer.

The examination of the Observatory Records, and Sunshine Cards, and the tabulation of Cup Anemograms has been kept up to date.

Library. 121 cards prepared for catalogue, MS. returns for binding. Inquiries as follows:—Newspapers, 7; Legal, 16; Scientific and Commercial, 91; Forecasts, 5; General, 6. The receipts in connexion with these amounted to £13 2s. 4d.

4. *Instruments Division.*—The usual Admiralty and office work. The Barograph at Aberdeen Telegraphic Station, having become defective, was replaced by another instrument.

Storm Warning Cones were sent to Port Knockie and Methil; and a Meteorograph box was sent to Sandford St. Martin.

Instruments have been supplied to the following :—

Vienna Meteorological Office.	Professor Thrift, Trinity College, Dublin.
Borough Surveyor, Ilfracombe.	Rev. E. H. Kempson, Isle of Man.
Dover Corporation.	Sena Sugar Factory Co.

Seven requisitions have been received from the Crown Agents for the Colonies; Sierra Leone (2), Cyprus, Straits, Fiji, Basutoland, and Gold Coast; also one from the Union of South Africa, and one from the Government of Western Australia.

Four Colonial requisitions are now in hand.

5. *Investigation of the Upper Air.*—Mr. Dines's Report for quarter ending 31st March, 1912.—The past quarter has been a most unfortunate one for the purposes of the investigation. I have been ill since the beginning of January, and acting under medical advice have been until quite lately obliged to abstain from kite flying.

Balloons were sent up on the appointed dates and on three other occasions, but a most unusual run of ill luck has occurred, and out of the eight sent up one only has been returned. According to four years' experience more than two-thirds should be found, and it appears that the chance of losing seven out of eight consecutive ascents is less than 1 to 400.

On the other hand I can report that last year's work (1911) was very successful, 24 successful ascents were made and there was hardly a single failure to obtain good traces and a good height.

I have supplied a considerable number of balloon meteorographs of late to various people and a sum of about £25 is due to the Meteorological Office. Inasmuch as last year's accounts show a balance of £18 odd on the right side I think it would be possible to somewhat extend the work in some definite direction, by weekly balloon ascents, for example, or by frequent ascents during special types of weather. On the other hand I have during the last year often felt the want of skilled scientific assistance, and I could not much extend the work without such assistance.

Publications.—Report for March and April from Clerk of Publications :—

—	March.		April.	
	Received.	Issued.	Received.	Issued.
Daily Weather Report	770	760	750	722
Weekly Weather Report	375	325	375	322
Monthly Weather Report, &c. ...	575 (Jan. and Feb.)	423 (Jan.), 431 (Feb.)	575 (March)	464
Do. do. (Maps)	25 (Jan. and Feb.)	2 (Jan. and Feb.)	25 (March)	22
Annual Summary, 1911	525	470	—	—
Do. do. (Maps) ...	30	1	—	—
Daily Readings	200 (Title page, &c., 1911)	175	—	—
Geophysical Journal	325 (August)	—	325 (Sept.)	123 (Aug.), 122 (Sept.)
Hourly Readings—Meteorological.—				
Kew	375 (Sept. and Oct.)	10	375 (Nov.)	11
Eskdale	375 (Sept. and Oct.)	10	375 (Nov.)	10
Valencia	250 (Sept. and Oct.)	10	250 (Nov.)	10
Monthly Meteorological Charts (Atlantic).	600 monthly to April (3)	517	600 monthly to May (2)	570
Monthly Meteorological Charts (Indian).	350 (April)	306	350 (May)	314
International Upper Air Observations	50 (Jan. and Feb., 1910)	30	50 (March and April, 1910)	30
Sixth Annual Report...	—	3	—	—
Berlin Report	—	2	—	18
"Forecasting Weather"	—	—	—	—
Cloud Atlas	—	1	—	—
Observer's Handbook (1908) ...	—	5	—	2
Do. do. (1909) ...	—	2	—	—
Do. do. (1911) ...	—	—	100	28
Barometer Manual	—	6	—	—

Receipts from sales at M.O.—18*s.* 4*d.*, March; 18*s.* 6*d.*, April.

New publications.—100 copies of the Observer's Handbook, 1911 edition, were received from the Stationery Office on 15th April. Geophysical Memoirs: Memoirs Nos. 1 and 3 have been signed for press; No. 2 has been returned for final revision. The MS. for the seventh edition of the Barometer Manual has been prepared, and sent to the Stationery Office.

M.O. Press.—During the two months ended 30th April, 1912, the issue of the Periodical Publications has been as follows, namely :—

Daily Weather Report.—As contract, except on two occasions when the current failed.

Weekly Weather Report.—As contract.

Monthly Weather Report.—As contract.

Monthly Meteorological Charts, North Atlantic.—As contract.

" " " Indian Ocean.—As contract.

On 1st March, 1912, there were five requisitions for forms, diagrams, &c., outstanding. Since that date six requisitions have been issued and three discharged, leaving eight requisitions still in hand.

The installation of the new printing machine has been completed, and it has been in use since April 18th. The old press is now under repair.

Observatories.—Reports for March and April.—Kew.—Meteorology.—The usual work and tabulations. International cloud observations, six days. An approximate zero correction has been determined for the standard barometer Adie No. 655, recently returned by Lord Rayleigh, who has had it on loan since 1885. The Dines anemometer has been cleaned and a fresh scale value determination made.

Magnetism.—Absolute observations on nine days. Quick runs in connexion with the Australasian Antarctic Expedition were taken on four days, also on April 17th during the solar eclipse. Preparation of a report on the Eskdale magnetic tables for 1911. Assistance in preparation of Falmouth tables for 1911.

The unifilar magnetometer No. 140 and dip circle No. 120 have been received back from Mr. Dover after their recent overhaul, and appear to be satisfactory. Two declination observations have been made with the magnetometer.

Electricity.—Absolute observations of potential gradient on 29 days. Observations with Ebert apparatus on 21 days, with Wilson apparatus on 18 days. Determination of electrograph scale value by photographic as well as by eye observations. Special observations of conductivity, number of ions, &c., by Mr. Dobson during solar eclipse.

Solar radiation.—Ångström observations on 18 days, and during the solar eclipse at one or two minute intervals.

Publications.—Data for "Geophysical Journal" prepared to end of January.

Supplies.—Photographic paper has been supplied to the India Office; also to Eskdale and Valencia.

Eskdale.—Grounds and buildings.—1,600 trees have been planted. Damp has appeared in the porch of the magnet house, and the exposed wall requires repair.

Meteorology.—Usual work and tabulations. The thermograph has been readjusted.

Magnetism.—Normal observations and tabulations and quick runs for Antarctic Expedition. Results of experiments made with the new V recorder appear satisfactory.

Seismology.—The Galitzin V recorder continues to require frequent adjustment on account of temperature change, and the recording cylinder has not been running very well. A report has been prepared on the unsatisfactory results obtained from the Omori and Wiechert instruments.

Electricity.—Normal work and tabulations. The zinc-copper voltmeter has been run in connexion with the Dolezalek. The result shows the desirability of making a change in the slab supporting the recorders. A few observations with Ebert's apparatus have been secured.

Solar radiation.—A few observations have been made.

Branch Office.—Report of Work, July–December, 1911.—Ten pilot balloons have been sent up, and the results evaluated.

Tethered balloons.—Three balloons have been followed with the theodolite. A report on tethered balloons has been prepared. Experiments have been made on the resistance of tethered balloons and spheres.

Direction-velocity anemometer.—A tracing and blue prints have been prepared. An arrangement has been made for a weekly chart to be used with the normal time scale. The anemometer has been modified to suit the standard form of record for direction and velocity. Records were obtained up to December 27th, when the direction recorder was taken down and sent to Munro as a pattern for a new instrument to be constructed by him on similar lines. Sketches of three different types of splayed anemometer vanes have been prepared and sent to the National Physical Laboratory, where tests on their relative efficiency have been carried out and reported upon.

Self-recording theodolites.—One of the self-recording attachments has been transferred from an old to a new theodolite. A new attachment is being made, and is nearly finished.

Observations in the Scilly Isles.—Assistance has been given to Mr. C. J. P. Cave in his investigation of air currents over the Scilly Islands.

Report of Work, January–April, 1912.—Pilot balloons have been sent up and the results tabulated at intervals of 15 seconds. A report has been prepared on the results obtained from pilot balloon ascents.

An attachment has been fitted to one recording theodolite to give a more open scale over a small range, for use when following the movements of tethered balloons.

A report has been prepared on the comparative gustiness of the wind at 36 and 98 feet above ground, and in connexion with this report experiments have been carried out on the damping effect of ½-inch connecting pipes on the records of the anemometer. A curve has been prepared utilising data from different sources, to show the change of wind velocity with height above the ground.

A memorandum on gusts has been drawn up in reply to questions received from the Admiralty.

Recommendations for airship tracks between Plymouth and Yarmouth based on the Daily Weather Report charts have been prepared.

Tethered balloons.—Further observations have been made and a report drawn up. A second set of experiments on the resistance of tethered balloons is in progress, and further tests on the resistance of spheres in an air current have been carried out in the air channel at the National Physical Laboratory.

Accounts (Minute 336).—Reported—the following reply from the Treasury Solicitor's department to the inquiry as to the legal position of the Office charges for attendance in Court on *subpœna* to produce documents belonging to the Office :—

MR. BARSTOW,

THIS question is not as simple as it would at first sight appear.

A good deal depends on the nature of the evidence to be given, *i.e.*, whether the witness is to be regarded as an expert witness or a witness of fact. If he were only asked to produce a record as, *e.g.*, that the force of the wind on the 20th January at Whitby was reported to his Office to have been six, this could scarcely be called expert evidence. If, however, something more than this were required, as *e.g.*, he were asked what the force of the wind was at some place other than a station, and this could only be estimated by considering the meteorological map for the day and the forces at the various surrounding places where there happened to be stations, this would no doubt be in the nature of expert evidence.

No person is bound to give expert evidence and for this therefore the Department could fix its own fee. An officer although no doubt bound to attend on his subpoena provided he were furnished with sufficient conduct money could decline to be sworn unless the fee fixed were paid.

If on the other hand the witness were one of mere fact he would be bound to attend and give evidence on payment of such amount as might be properly payable according to the rules of Court, and neither he nor his office would be entitled to set up as against such amount a fee fixed by his Office. The amount payable to a witness in the High Court varies according to his profession or business, or his station in life, and in the case of Public Service the allowance is usually based on the amount of the witnesses' salary by way of recoupment to the employer. The amount payable in the County Court would be less.

In the circumstances, as there would in some cases no doubt be difficulty in determining whether the evidence to be given was of an expert character or of fact, I should be inclined to leave the practice as it stands and get the fee of £2. 2. 0 when I could.

I must apologise for having been so long answering this, but the paper somehow or other got mixed with some other papers of mine and I omitted to discover it until the other day.

H. E. F. C.

22nd April, 1912.

Submitted—The following statement :—

	£	*s.*	*d.*
Bank balance on 29th February, 1912	2,297	3	4
Receipts from 1st March, to 30th April, 1912	5,847	5	2
	8,144	8	6
Cheques drawn from 1st March, to 30th April, 1912	4,718	9	5
Bank balance on 30th April, 1912	£3,425	19	1

Submitted—The following Statement of Accounts for the Year ending 31st March, 1912:—

RECEIPTS.						PAYMENTS.				
1910-11. £ s. d.		£ s. d.		1911-12. £ s. d.	1910-11. £ s. d.		£ s. d.		1911-12. £ s. d.
2,206 14 8	Balance from year 1910-11	—		1,298 16 3	1,000 0 0	Director...	—		1,000 0 0
16,750 0 0	Parliamentary vote..	—		16,850 0 0		OFFICE SALARIES:			
	M. O. OBSERVATORIES:				7,397 5 5	Clerical Staff, monthly	7,720 14 11		
*529 16 4	Kew	909 9 8			269 18 11	„ „ weekly	288 18 7		
*758 0 0	Eskdalemuir ...	1,123 15 1			372 7 2	Messengers „	391 13 6		
17 10 0	Valencia	17 10 0		2,050 14 9					8,401 7 0
	DEPARTMENTAL EXPENSES REPAID:				*1,085 2 2	M.O. OBSERVATORIES: Kew	1,587 13 0		
215 4 0	Forecasts, &c. ...	207 10 9			*808 18 5	Eskdalemuir	1,379 18 7		
	Marine, Statistics, and Observa-				474 8 6	Valencia	471 15 5		
92 10 3	tories	126 13 11							3,439 7 0
139 7 9	Instruments ...	133 13 4				OFFICE EXPENSES:			
				467 18 0	817 2 8	Rent, Fuel, &c. ...	663 16 8		
	INCIDENTAL EXPENSES REPAID:					Furniture, Fittings,			
375 15 8	Forecasts, &c. ...	397 6 10			421 15 5	&c.	538 9 10		
78 15 3	Other Branches ...	66 6 5			456 19 3	Incidental	400 3 0		
	Stationery Office								1,622 9 6
47 7 7	Account ...	52 5 11							
				515 19 2		POSTAGE AND TELEGRAMS:			
	TELEGRAPH CHARGES REPAID:				291 17 6	General Postage ...	306 16 2		
						Postage of Daily			
158 13 10	Home	229 12 11			343 11 10	Weather Reports ...	348 19 2		
	Telegrams sent								
349 13 9	abroad	433 16 7			2,338 1 4	Telegrams, &c. ...	2,831 13 5		
				663 9 6					3,487 8 9
	INSTRUMENTS:					TRAVELLING EXPENSES			
506 4 6	Royal Navy ...	512 4 6			327 14	AND INSPECTIONS...	—		280 13 9
	Mercantile Marine,								
1,489 10 5	Stations, &c. ...	1,130 13 10							
				1,642 18 4	1,691 0 0	SUPERANNUATION ...	—		1,382 2 0
48 2 6	OBSERVATORIES': Forms, &c. ...	—		138 2 0		COST OF INSTRUMENTS:			
					506 4 6	Royal Navy	510 8 6		
	SUPERANNUATION ACCOUNT:				1,865 18 0	Mercantile Marine, Stations, &c. ...	1,647 15 6		
565 0 0	Annuities	606 17 6							2,158 4 0
	Interest on Invest-					AUXILIARY OBSERVA-			
66 5 7	ment	80 15 10			2,484 8 7	TORIES, &C.	—		2,386 11 3
	Income Tax re-								
—	turned	17 10 0				LECTURES AND EX-			
				705 3 4	458 3 1	PERIMENTS ...	—		417 13 4
	LECTURES AND EX-					ANTARCTIC METEORO-			
325 5 8	PERIMENTS ...	—		585 12 7	10 5 3	LOGY	—		—
0 0 10	AMOUNT REFUNDED	—		—					
						BALANCE:			
	DONATIONS FOR MEMORIAL MEDALLIONS				1,270 0 4	Cash at Bank... ...	361 17 0		—
—		—		61 9 0	28 15 11	„ at Office ...	42 9 4		
									404 6 4
£24,719 18 7				£24,980 2 11	£24,719 18 7				£24,980 2 11

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.	£ s. d.		£ s. d.		£ s. d.
1,453 8 2	To sundry creditors	1,451 4 4	1,298 16 3	By cash at Bank and at Office ...	404 6 4		
14 0 6	„ salaries reserved	—	186 14 11	„ M.O. instruments in stock	295 11 9		
522 8 0	„ balance	198 7 5	504 5 6	„ sundry debtors	949 13 8		
£1,989 16 8		£1,649 11 9	£1,989 16 8		£1,649 11 9		

NOTE.—On 31st March the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £2,119 5*s.* 11*d.*

* These figures are for the nine months ending 31st March.

Observatories.—Statement of Accounts for the year ended 31st March, 1912 :—

KEW.

July, 1910—March, 1911.	*Receipts.*		July, 1910—March, 1911.	*Payments.*		
£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
212 7 4	Gassiot Trust	446 17 11	497 5 0	Superintendent		656 10 10
281 5 0	National Physical Laboratory ...	375 0 0	287 7 3	Assistants		405 8 5
1 6 0	Grazing Rents	5 0 0	56 2 6	Caretaker...		81 10 0
34 18 0	Miscellaneous	82 11 9	10 15 0	Sundays and holidays ...	16 5 0	
555 5 10	To Balance	678 3 4	38 7 6	Overtime	94 2 9	
						110 7 9
			72 10 4	Rent, fuel, and lighting		116 16 9
			7 5 9	Repairs		5 12 10
			30 8 6	Insurance...		5 12 3
			37 14 10	Materials		59 13 0
			1 6 5	Instruments		37 9 11
			6 18 1	Books, printing, and stationery		37 15 10
			39 1 0	Incidental expenses ...		70 15 5
£1,085 2 2		£1,587 13 0	£1,085 2 2			£1,587 13 0

ESKDALE.

July, 1910—March, 1911.			July, 1910—March, 1911.			
£ s. d.		£ s. d.	£ s. d		£ s. d.	£ s. d.
750 0 0	Royal Society (Parliamentary Grant)	1,000 0 0	300 0 0	Superintendent		400 0 0
			172 10 0	Assistants		375 16 2
—	Dr. Schuster...	104 9 10	81 18 0	Mechanic and Caretaker		109 4 0
—	Miscellaneous	19 5 3	39 0 0	Handyman		52 0 0
50 18 5	To Balance	256 3 6	20 14 9	Books, stationery, &c. ...		23 18 9
			12 8 6	Insurance		10 18 4
			14 3 10	Travelling expenses ...		39 9 2
				Incidental expenses :—		
			27 15 0	Rental of private wire	27 15 0	
			18 5 8	Instruments and repairs	154 1 10	
			28 10 1	Photographic paper ...	53 13 9	
			55 14 7	Coals and carriage of coals, light	75 5 10	
			6 7 10	Repairs, &c.	13 13 0	
			23 10 2	Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	44 2 9	
						368 12 2
£800 18 5		£1,379 18 7	£800 18 5			£1,379 18 7

VALENCIA.

April, 1910—March, 1911.			April, 1910—March, 1911.		
£ s. d.		£ s. d.	£ s. d.		£ s. d.
17 10 0	Grazing Rent	17 10 0	275 0 0	Superintendent	275 0 0
456 18 6	To Balance	454 5 5	121 0 0	Assistants	122 5 0
			22 6 0	Rent, rates, and taxes	19 12 2
			56 2 6	Miscellaneous expenses	54 18 3
£474 8 6		£471 15 5	£474 8 6		£471 15 5

ACCOUNTS FOR 1911–12.

COMPARISON of EXPENDITURE with ESTIMATES, 1911–12.

Items.	Heads of Service.	Estimates November and December, 1910 (Minutes 266 and 275).	Expenditure 1911-12.	Excess.	Defect.
		£	£ s. d.	£ s. d.	£ s. d.
1	Director	1,000	1,000 0 0	—	—
2	Office Salaries	8,279	8,401 7 0	122 7 0	—
3	M.O. Observatories	3,112	3,439 7 0	327 7 0	—
	Office Expenses :—				
4	Rent, Fuel and Lighting	690	683 16 8	—	6 3 4
5	Furniture, fittings, &c.	50	25 10 0	—	24 10 0
5*a*	Fittings, &c., for new Office ...	—	496 7 7	496 7 7	—
6	Incidental Expenses	385	416 15 3	31 15 3	—
	Postage and Telegrams :—				
7	Postage	600	655 15 4	55 15 4	—
8	Telegrams from inland stations and H.M. Ships.	550	603 12 7	53 12 7	—
9	„ from Mercantile Marine...	350	351 18 11	1 18 11	—
10	„ from abroad	370	387 5 1	17 5 1	—
11	„ sent abroad	500	569 19 5	69 19 5	—
12	„ Storm Warnings	300	458 3 9	158 3 9	—
13	„ Harvest Forecasts ...	85	67 16 3	—	17 3 9
14	„ sundry telegrams... ...	90	129 5 0	39 5 0	—
15	„ private wires, &c. ...	30	13 5 0	—	16 15 0
16	Allowances to Clerks	150	250 7 5	100 7 5	—
17	Travelling Expenses	320	280 13 9	—	39 6 3
	Superannuation :—				
18	Operative	1,208	1,052 12 6	—	155 7 6
19	Fund	328	329 9 6	1 9 6	—
	Cost of Instruments :—				
20	For Office use and Stations	300	370 9 8	70 9 8	—
21	For Colonial Governments, &c. ...	1,490	1,277 5 10	—	212 14 2
22	For Royal Navy	510	510 8 6	0 8 6	—
23	Allowances to Observatories, &c. ...	2,385	2,386 11 3	1 11 3	—
24	Lectures and Experiments	375	417 13 4	42 13 4	—
	Totals...	23,457	24,575 16 7	1,590 16 7	472 0 0

COMPARISON of RECEIPTS with ESTIMATES, 1911–12.

Items.	Appropriations in Aid.	Estimates November and December, 1910 (Minutes 266 and 275).	Receipts 1911–12.	Excess.	Defect.
		£	£ s. d.	£ s. d.	£ s. d.
25	Observatory Expenses refunded ...	1,862	2,050 14 9	188 14 9	—
26	Departmental Expenses refunded ...	395	467 18 0	72 18 0	—
27	Incidental Expenses refunded ...	475	515 19 2	40 19 2	—
28	Telegraphic Expenses refunded ...	610	663 9 6	53 9 6	—
	Costs of Instruments refunded :—				
29	Royal Navy	510	512 4 6	2 4 6	—
30	Other sources	1,490	1,130 13 10	—	359 6 2
31	Superannuation	780	705 3 4	—	74 16 8
32	Lectures and Experiments	410	585 12 7	175 12 7	—
33	Amount refunded	—	61 9 0	61 9 0	—
34	Sunshine Cards, &c.	75	138 2 0	63 2 0	—
	Total	6,607	6,831 6 8	658 9 6	434 2 10

	£ s. d.
Expenditure in excess of estimate	1,118 16 7
Receipts „ „	224 6 8
Net expenditure „ „	894 9 11

EXPENDITURE, 1911-12.

2. Mr. C. Harding was retained on the staff for six months.

3. Increase is mainly on Eskdale. It includes £108 6*s.* 8*d.* for Mr. Southerns, since repaid by Royal Society. Also £154 1*s.* 10*d.* for new instruments and repairs, of which £104 9*s.* 10*d.* was paid by Dr. Schuster.

8. Thirteen monthly accounts from Post Office were paid during the year.

12. The charge for Storm Warnings was exceptionally heavy.

16. The allowances for clerks included charges for attendance at South Kensington Post Office from October, 1910, to December, 1911—£85 19*s.* 1*d.*

18. Mr. Harding received annuity for only six months, showing a defect of £75. Mr. Call's pension—£58 15*s.*—is charged under "Investment."

20. Includes £184 2*s.* 3*d.* for Special Theodolites, part of which will come back.

24. Estimate includes payment of £350 for Schuster Reader, but only £87 10*s.* was paid. Estimate includes nothing for S. Farnborough, but payments under this head were £274 18*s.* 10*d.*

APPROPRIATIONS IN AID.

25. Prof. Schuster for new seismograph, £104 9*s.* 10*d.*

Receipts for photographic paper, &c., were £62 11*s.* 9*d.* above estimate.

26. Increase is mainly in Divisions 2 and 3.

28. Thirteen months' repayments made during the year.

30. Stock of instruments increased by £108 16*s.* 10*d.*

32. Receipts on account of Branch Office at South Farnborough were not estimated for.

34. Sunshine cards are paid for under Observatories.

In explanation of the excess of actual over estimated net expenditure to the extent of £894 9*s.* 11*d.*, the following items of non-recurring expenditure are properly chargeable against balance:—

	£	*s.*	*d.*
Fittings for new Office	496	7	7
Theodolites	184	2	3
Arrears of Post Office Accounts	67	0	0
Excess of expenditure over receipts for instruments bought on commission	147	0	0
Total	894	9	10

So that having regard to charges for current expenditure only the deviations from the estimates have balanced. The charge for Storm Warnings is the chief item of casual increase. The new charges beyond the estimate which are recurrent are:—

	£	
Salaries: Increases on revision of messengers' duties (Order 146) ...	26	
Laboratory Boy	26	
Substitute for Cleaners	2	
Sunday observers	6	
		60
Post Office...		73
Total		£133

It must also be remarked that a number of payments to the Office of Works, both for the Office and Observatories, are outstanding because the accounts are rendered some time after date.

When the sum due from the Royal Society, £108 6*s.* 8*d.*, is set against the net excess under the head "Observatories," viz.: £138 12*s.* 3*d.*, the balance is £30 5*s.* 7*d.*, but a heavy cost for works at Eskdalemuir has not yet been met. Both the expenditure and the appropriations are affected to the extent of £104 for the new seismograph. The sale of photographic paper has been much larger than was estimated for.

FORTY-THIRD MEETING.

South Kensington, S.W., 3rd July, 1912.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

CAPTAIN HARVEY. | MR. MIDDLETON.

DR. SCHUSTER.

352. The Minutes (343–351) of the last Meeting (1st May, 1912) were read and confirmed, with the addition of a note in explanation of the excess of estimated over actual expenditure (Minute 351).

The expenditure in excess of the estimates was approved.

353. *New Office.—Post Offices Charges* (Minute 344).—The Post Office letter 295255 was further considered, and it was agreed to bring the matter to the notice of the Treasury, and to ask permission of the Post Office to defer a reply until Their Lordships' wishes are ascertained. The following letter was approved :—

SIR, 11th July, 1912.

I AM authorised by the Meteorological Committee to bring to your notice a letter which has been received from the Post Office with reference to the charges for the delivery of Meteorological Telegrams.

The Postmaster-General claims a sum which is estimated at £400 a year, in addition to the payments which have been claimed since the occupation of the new Office in October, 1910. The new charge is on account of the delivery of messages transmitted at special rates by agreement with Foreign Government offices, and its justification is that at the transmitting end they are Government messages, and that the agreement only brings them to London.

Claims were made by the Post Office in 1879 in connexion with these or similar messages, but after correspondence they were waived (Post Office letter 103002–1879) upon the representation that the telegrams were the counterpart of an international agreement by which certain foreign offices agreed to send messages to the Meteorological Office. The principle then adopted was that the Office paid for the telegrams which it sent, but not for the telegrams which it received in exchange. The arrangement has not been disturbed since that time.

The claims are now revived on the ground that the arrangement with foreign countries does not provide for carrying the messages to the Meteorological Office, but only to the Central Telegraph Office. The payment of the usual inland rates is claimed for sending them from the Central Telegraph Office to the Meteorological Office.

Owing to the difference of treatment of Meteorological Messages by different Governments, the financial arrangements for the exchange of information are necessarily intricate. We on this side of the Channel are constantly finding more opportunities for the assertion of the principle that Meteorological Telegrams must be paid for at ordinary rates, whereas Foreign Governments are equally careful to avail themselves of the privilege of their concessions to secure free transmission whenever possible. At the same time the general principle is one of exchange of information between Meteorological Offices, and any disturbance of the existing arrangement should involve the foreign offices which have undertaken to send information to this Office. Some of the considerations in the existing agreements are obsolete or inconvenient, and clearly, if one part is raised, the whole would fall to be considered, so that the claim of the Post Office may be regarded as part of a much larger question which involves more than the £400 mentioned in the letter.

As an alternative by which the Meteorological Office may (subject to Their Lordships' sanction of the waiver of another claim of £90) "save" the considerable sum of £430 a year, the Postmaster-General proposes the installation of two telephone circuits between the Meteorological Office and the Central Telegraph Office. The Meteorological Committee regret that they cannot see their way to regard this as a satisfactory solution for two reasons :—

(1) The new building has been constructed for the delivery of the telegrams by tube and not by telephone. If the telephones are to be adopted, structural alterations will be required which cannot properly be arranged without additional space. The Committee venture to point out that the claims for delivery by tube, which now amount altogether to about £520 a year, might have been as easily pointed out when the subject was originally discussed at the Post Office in 1907, before the plans were completed, as five years later, when all the revised arrangements have been actually in operation for nearly two years.

(2) Delivery by telephone is not a satisfactory method of transmitting Meteorological Telegrams. It may be supposed from the actual practice that the Postmaster-General does not himself consider it a satisfactory method of transmission of ordinary telegrams, for if £430 a year could be saved by using telephonic instead of telegraphic communication for a portion only of the Meteorological Telegrams, there would clearly be an irresistible inducement to use telephones for all communications between the South Kensington Post Office and the Central Telegraph Office. For Meteorological

Telegrams, where the accuracy of each figure is of vital importance to the message, the orderly process adopted for securing accuracy by telegraph is greatly to be preferred to telephonic communication, especially when a large number of messages have to be taken in rapid succession. It is necessary for the Committee to add that they could not now accept delivery of the telegrams by private wires without providing additional staff to take off the messages. The claim which the Postmaster-General now puts forward seems to the Meteorological Committee to be based upon a harsh interpretation of the international agreements, which have been arranged in conformity with Their Lordships' wish that the cost of meteorological telegraphy in this country should appear in the Meteorological Office accounts. The Committee have no wish either to spend £400 a year more upon telegraphy than they do at present, without additional service, nor to raise the question in this form with Foreign Governments, nor to be obliged to hire and man either two private wires or two telephones. What they really require is at most :—

(i) The exclusive use of two wires between the Central Telegraph Office and South Kensington, and men to work them, daily from 7.15 a.m. to 9.30 a.m., from 1 p.m. to 2.15 p.m. (except Sundays), and from 6 p.m. to 7.15 p.m. For the reception of Meteorological Telegrams outside those limits they have no wish to ask for special consideration either as regards wires or men.

(ii) They also require direct communication with the Central Telegraph Office by telegraph or telephone for the purpose of facilitating business.

The Committee venture to ask Their Lordships' once more to help them by obtaining these privileges, which the Postmaster General has it in his power to grant.

If an appropriate payment for these special services over and above the payments ordinarily charged for telegrams could be fixed, the matter could be considered in its most favourable aspect.

Their Lordships are already aware, from the letter of the Meteorological Committee dated December 11th, 1911, that their funds are already insufficient for the work which they have in hand, and they are therefore unable out of their own funds to meet the additional sum which the Post Office claims for the delivery of foreign messages.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
London, S.W.

354. *National Insurance Act.*—In view of the commencement of the operation of the National Insurance Act on July 15th, 1912, it was agreed that application be made to the Insurance Commission for exception in accordance with Schedule I (b) of the Act from the operation of the Act in the case of Staff Clerks, Clerk Assistants, Women Clerks, Office Keepers and Supernumerary Clerks subject to deduction for Endowment Assurance, on the ground that the provision for sickness and disablement benefit provided by the regulations is, on the whole, not less than that provided under the Act.

With this application in view it was agreed :—

(i) That the provision for superannuation for Classified Clerks be extended to Clerk Assistants.

(ii) That the practice as regards sick pay for the categories mentioned be regulated by Minute 165 :—" When sick leave on full pay has been " allowed for six months, it must be understood to have covered the " allowance of ordinary leave within the year, and that any further leave " could only be given upon a special doctor's certificate, and at half pay."

It was further agreed that the employees at the Office or observatories not included in the categories above mentioned be insured in the ordinary way under the Act, and that the benefits allowed by the Act be supplemented, if necessary, to make the position of the employees not less advantageous than before July 15th, 1912.

355. *Seventh Annual Report* (Minute 346).—The text of the Seventh Annual Report was approved and signed.

356. *Meteorological Office Observatories* (Minute 347).—*Gassiot Committee.*—A meeting of the Gassiot Committee was held on June 12th.

Proofs of the publication *Hourly Values—Geophysical Section* up to page 17 were submitted.

Kew Observatory.—Structural alterations (Minute 335).—Reported the receipt of the following letter from the National Physical Laboratory :—

The National Physical Laboratory,
Teddington, Middlesex,
25th June, 1912.

DEAR Dr. SHAW,

THE Executive Committee of the Laboratory at their last meeting had under consideration the report of the architect, Mr. Caröe, as to the progress of the new buildings, and the views of the Building Committee as to the date at which the test work could be transferred from Kew. The Observatory is held, as you are aware, by the Royal Society under license from the Crown and the

testing of thermometers was commenced there in 1852–53. Mr. Caröe explained that the work had been delayed by the strikes and wrote as to the future : " But for the interruption of strikes I do not " think there need be any doubt that Dorey will complete the work by Christmas in accordance with " his promise."

It was originally hoped to commence the work last October and complete it this summer. My serious illness made that impossible and the Committee greatly regret the inevitable delay.

The Committee have given careful consideration to the possibility of admitting the Contractors who are to carry out the alterations at the Kew Observatory while the test work is still in progress there, and with great regret have come to the conclusion that such a course is only practicable to a very limited extent.

While temporary arrangements may be made to accommodate some part of the work, it is not possible to remove the Optical test work, including the tests on sextants, from Kew until the new buildings at Teddington are in partial occupation, *i.e.*, until December 31st, 1912.

Arrangements can, however, be made to clear at least one room on the ground floor, or possibly on the first floor, by October 31st, 1912, which the Caretaker and his wife can occupy as a bedroom.

The Optical test work is mostly for the Admiralty and must be carried through with regularity and despatch. Freedom from dust and vibration is essential and the tests could not go on satisfactorily with workmen on the premises. Besides, it is important to consider the risk to health which would be incurred if the old drains in the basement and the sanitary arrangements inside were interfered with when the building is fully occupied.

The Executive Committee of the Laboratory therefore cannot fix a date earlier than January 1st, 1913, for the admission of workmen within any of the buildings at the Observatory.

The Committee have no objection to external work such as the excavation of new cesspools and the laying of the drains being done before the removal of the Laboratory Staff provided it does not interrupt the test work, but they demur to the old drains in the basement and the sanitary arrangements inside being interfered with while the Laboratory Staff is employed in the building.

Yours truly,

R. T. GLAZEBROOK,
Director.

Dr. W. N. Shaw, F.R.S.,
Director, Meteorological Office,
South Kensington, S.W.

It was agreed to forward a copy of the letter to the Office of Works, with the following covering letter :—

Kew Observatory.

18th July, 1912.

SIR,

THE transfer of the testing work of the National Physical Laboratory from Kew Observatory to Teddington has been the subject of prolonged negotiations between the Meteorological Committee and the Executive Committee of the Laboratory.

The Meteorological Committee were anxious that nothing should stand in the way of the alterations to the Observatory, for which, as the Committee were informed by Treasury Letter dated 7th February, 1912, the necessary provision had been made in the Estimates for the current financial year.

The Meteorological Committee had been informed that plans for the necessary buildings at Teddington had been approved by the Laboratory Committee and tenders were awaited, in October last, and there was every reason to suppose that the transfer would take place during the current summer. But the matter was delayed, first, on account of the long aud serious illness of the Director of the Laboratory, and, secondly, by the Coal Strike, and now, again, by the Dock Strike. Meanwhile, the urgency of the matter from the point of view of the Meteorological Committee is in no wise diminished, as the Caretaker and his wife have both been off duty on sick leave and their son has died at the Observatory during the year.

The Committee have therefore made urgent representations to the Executive Committee of the Laboratory to use the greatest possible despatch in arrangements that will allow of the proposed structural alterations at the Observatory being carried out. In reply a letter has been received, of which a copy is enclosed, from which it appears that :—

(1) arrangement can be made to clear one room on the ground floor, or possibly on the first floor, by October 31st, 1912, which the Caretaker and his wife can occupy as a bedroom ; and

(2) that the rest of the work cannot be moved to enable the workmen to carry out the alterations at Kew Observatory until January 1st, 1913.

The Meteorological Committee trust that the First Commissioner will be good enough to allow preparation to be made as far as possible for the commencement of the work at the beginning of next year, and for pushing it forward as quickly as possible as soon as access can be obtained.

I am, &c.,

W. N. SHAW.

The Secretary,
H.M. Office of Works,
Westminster, S.W.

Eskdale Observatory (Minute 347).—The Director reported that after circulation for approval to the members of the committee, and after communication in the first instance to the Superintendents of Kew and Eskdale, the following report had been sent to the Gassiot Committee :—

Eskdalemuir Observatory.

The Meteorological Committee beg leave to present to the Gassiot Committee the following report :—

The Meteorological Committee have had under consideration the scheme of administration of the Observatory at Eskdalemuir, of which they have now nearly two years' experience. A year's work

in Terrestrial Magnetism, including the tabulation of the records, has been completed, and the tables are now being prepared for publication.

2. The administration of the Observatory was transferred to the Director and Committee of the Meteorological Office on July 1st, 1910, with certain conditions and provisions for the conduct of the Observatory as arranged by the National Physical Laboratory. The Committee desire to call the attention of the Gassiot Committee to certain of these conditions and provisions.

i. A primary condition was that laid down by the Magnetic Committee of the National Physical Laboratory in 1906 (M.O. Minute 248), "That the Superintendent of the Observatory Department "[of the National Physical Laboratory] should remain in charge of the magnetic work of the two "observatories" [Eskdalemuir and Kew]. This condition has not been found to work satisfactorily.

ii. The provision set out for the information of H.M. Government in the Statement of Buildings required for the Observatory (Minute 248, *Buildings Required*) of "two rooms additional for use by the Superintendent or visitors working at magnetic observations" as an adjunct to the "House for Senior Assistant, say six rooms and offices" has been inoperative.

iii. Provision XI as set out in the same Minute, "House for Caretaker and Housekeeper (man and wife) with rooms for Junior Assistant and Computer" is represented in the actual buildings by a five-roomed house (sitting room, three bedrooms, kitchen and offices) in communication with the assistants' quarters (sitting room, three bedrooms and offices). The plan has worked badly; the caretaker's wife's health, strength, or inclination, being unequal to the task. The full occupation of the accommodation has been resisted, disagreements have occurred as to the payments for board and obvious facilities afforded by spare rooms have been neglected, to the disadvantage of the Observatory.

The Superintendent has recently asked that the services of the mechanic and caretaker (whose wife is housekeeper) may be dispensed with on the ground of insubordination. Action in conformity with his request has been authorised by Director's Order No. 198, subject to the approval by order of the terms of appointment of a new mechanic-caretaker and new housekeeper (preferably but not necessarily man and wife) with revised arrangements for board and attendance upon the assistants, designed to secure all available facilities for the accommodation of the present or future staff.

iv. A provision in all the appointments of the staff for exchanging the services of the workers from time to time may be properly interpreted to mean that the National Physical Laboratory contemplated the relief of the workers from permanent employment under the conditions of the Observatory. This provision is also a "dead letter" owing to a certain incompatibility between the observatories.

3. Having regard to the isolated position of the Observatory, the Meteorological Committee attach great importance to all the arrangements of the National Physical Laboratory for making the resident quarters provided by Government easily available for temporary occupation. The requirements in this respect will become more pressing. The completion of the meteorological equipment of the Observatory as recommended by the Gassiot Committee involves the appointment, as soon as the necessary funds are available, of a Meteorologist as Professional Assistant, and an additional member of the clerical staff in addition to the Professional Assistant for Seismology, now temporarily appointed. They have advised the Director to have regard to these requirements in considering the arrangements for replacing the caretaker and housekeeper.

4. They propose to take steps to ensure in future the carrying out the intentions of the National Physical Laboratory with regard to the guest rooms in the "House for Senior Assistant," and to make provision for the use of the rooms being at the disposal of the Director, by altering, if necessary, the terms upon which the Superintendent occupies the house. They attach less importance to permanence of tenure of the appointments than to facilities for study, and the occasional relief of members of the staff by exchange.

5. As at present advised, they are of opinion that the regulation under which "the Superintendent of the Observatory Department" remains in charge of the magnetic work at Eskdalemuir as well as Kew may be waived with advantage.

6. The opinions expressed in paragraphs 3 to 5 indicate the action which the Director and Committee of the Meteorological Office propose to take in discharge of the duties entrusted to them by H.M. Treasury. They recognise, however, that the lines upon which the National Physical Laboratory laid down the scheme of administration were guided by principles of subordination or co-operation which, although they have undoubted utility, may be contrasted with the principle of personal freedom of development of scientific activity controlled only by the limitations of Estimates and Audits and of periodical reports. Successful examples of either form of organization may be quoted, and the Meteorological Committee are of opinion that the Gassiot Committee should have an opportunity of expressing their views upon the suggestions indicated in the paragraphs 3 to 5, as compared with the "opinion that the scheme of administration be modified in such a way as to leave "the scientific and domestic administration of the Observatory in the hands of the Superintendent "during the term of office of the present holder, subject to periodical reports to the Director and the "limitations of Estimates and Audit."

W. N. SHAW,
Chairman.

16th May, 1912.

Reported further the receipt of a letter dated May 10th, from Mr. Southerns, stating that he had reluctantly come to think it would be better for him to try in good earnest to get another post before next term, on account of the conditions of duty at the Observatory. Further, that on May 13th the Superintendent had telegraphed asking for permission to dismiss Mr. and Mrs. Black, mechanic and housekeeper, and on receipt of the reply had arranged for the dismissal to take effect from 20th May. In answering a letter of remonstrance on 11th May Mr. Black had asked to be allowed to get away by the end of the month. His wages had been paid to May 31st, and an advertisement for

a successor, on the terms printed below had been inserted in "Nature", the "English Mechanic" and other newspapers. These circumstances had been referred to in a letter to the President of the Royal, Society, of the 16th May, covering the Committee's Report. On the 6th June a letter was received from Mr. Walker, enclosing a Certificate from Professor R. Stockman, M.D., of Glasgow, which recommended for Mr. Walker a complete change of scene and occupation for six weeks or so, and announcing his intention of leaving for London on 7th June. The Observatory had accordingly been placed in charge of Mr. Southerns 108 replies were received to the advertisement, but the selection of candidates was not completed when Mr. Walker left. As the caretaker's house and the assistants' quarters were left without a housekeeper, the work of the assistants being done by Mrs. Walker's servant, under the superintendence of Mrs. Walker, sen., it was arranged on June 19th that Mr. F.W.Lowe and his wife should go to Eskdalemuir on June 24th to make a trial for a month. The report by Mr. Southerns after their arrival was most unfavourable, and on June 29th, they were sent back on the recommendation of John Campbell, physcian and surgeon. Mr.Lowe called on July 1st, and on July 2nd presented a certificate from F. Norman, F.R.C.S., explaining his wife's illness at Eskdalemuir.

Eskdalemuir Observatory.

Mechanic- Caretaker. The duties of the Mechanic-Caretaker, who has a "handy-man" to assist him, are:-

1. General care of grounds & building and cleaning of offices.
2. Supervision of the acetylene gas producer to maintain a regular supply of gas for the photographic recording instruments.
3. Attendance to the heating of the Offices.
4. Superintendence of the water supply of the Observatory.
5. Attendance to the drainage system of the Observatory, including the necessary care of the filter beds.
6. Execution of repairs to apparatus when necessary.
7. Such other mechanical services as the Superintendent may from time to time require in the interests of the Observatory.

The ordinary hours of attendance of Assistants at the Observatory are from 9 a.m. to 4.30 p.m. with a dinner hour (Saturdays 9 a.m. to 12.30 p.m.)

Two weeks holiday are allowed each year, in addition to such equivalents for public holidays as may be allowed by the Superindent.

The Mechanic-Caretaker will live on the premises in furnished rooms which are provided, with coals and light. He will pay 3s a week to the housekeeper for cooking and attendance, including washing of bed and table linen. He will arrange with the housekeeper for board, terms to be reported to the Superintendent for approval.

House-keeper:- The duties of the Housekeeper are to keep house for the Assistants, on terms approved by the Superintendent acting for the Director.

The total accommodation under the charge of the Housekeeper comprises:-

Caretaker's house	kitchen parlour three bed-rooms
The Assistants' quarters, adjoining	sitting room three bed-rooms

It is proposed to allocate these rooms as follows:-

For the use of Housekeeper - Kitchen and bed-room
Mechanic-Caretaker - Bed-room and use of parlour.
Two assistants - Two bedrooms and use of parlour.
Two Professional Assistants - Two bedrooms and sitting room.

It is intended that in future each member of the resident staff except the Mechanic-Caretaker, shall repay to the Observatory 5s per week for furnished rooms, coal and light, and each, including the Mechanic-Caretaker, shall pay 3s per week to the Housekeeper for attendance, including cooking and the washing of house and table linen, which is provided.

The resident staff will conjoimtly arrange with the Housekeeper fc for board, on terms which will be reported to the Superintendent for approval.

If the Mechanic-Caretaker and Housekeeper are man and wife the parlour will be regarded as belonging to them, but with the provision that the Assistants have the use of it as they require. The accommodation of the Caretaker and Housekeeper will thus include kitchen, two bedrooms, and parlour.

Wages of Mechanic and Caretaker and of Housekeeper:- The wages of the Mechanic-Caretaker are £2 a week, with furnished room, coals and light, and share of sitting room.

The maximum rate of wages for mechanical assistants on the staff of the Meteorological Office, if resident quarters are provided, is £2 12s a week. Rise of wages, of 2s a week, is subject to satisfactory certificates as to work and conduct, and is contingent upon the provision of funds by a Parliamentary Grant.

The services of the Mechanic may be transferred to the Meteorological Office or one of the other Observatories of the Office. While he is on duty away from Eskdalemuir he will be allowed 5s a week extra in lieu of quarters.

The wages of the Housekeeper are £20 a year with 3s a week from each of the staff resident in the house, for cooking, attendance, and washing of house and table linen.

The wages of man and wife as Mechanic-Caretaker and Housekeeper will be £2 4s a week, and may rise by 2s a week to £2 16s.

If more than three Assistants are quartered in the establishment and meals have to be served in two siting rooms, an allowance of £17 a year will be made to the Housekeeper towards the cost of employing a maid, and 3s a week for each additional resident will also be payable to the Housekeeper.

Reported further:- that sanction had been given to the employment by Mr. Walker, of an additional assistant as a substitute clerk at 30s a week for 16 weeks (and £2 for travelling expenses) during the absence of the regular staff on leave, and that Mr. Walker had selected Mr. J. Jamieson (recommended by Professor Becker of Glasgow) who had arrived at the Observatory on June 14th.

It was agreed that the conditions of appointment of the Superintendent of the Instruments Division, printed in Minute 341, be modified to provide that one or more periods of duty as Superintendent of Eskdalemuir Observatory be made a condition of appointment, in case the Gassiot Committee so recommend, and that the post of Superintendent of Instruments be offered to Mr.F.J.W.Whipple,M.A., Assistant Master at Merchant Taylors' School, if he is willing to accept the terms of appointment so modified. That the salary of the appointment in that case be £450, rising by £25 a year to £500, at the discretion of the Director, with Sir George Darwin and Dr. Schuster in consultation with the Gassiot Committee.

Director's Order No. 200 for the appointment of a clerk substitute at Eskdalemuir for 16 weeks was approved.

The payment of a week's wages and travelling expenses to and from Eskdalemuir for Mr and Mrs. Lowe was authorised.

Omori Seismograph (Minute 310) - The presentation to the Japanese Government of a watch by Usher and Cole in lieu of the return of the seismograph at the close of the period of loan for two years, which ends in October next, as requested by Professor Omori during his visit in July, 1911, was authorised.

357. International Meteorology - Meetings of the Commissions in September (Minute 351) - Authority was given to make an application to the Government Hospitality Committee in connection with the meetings of the Commissions for Maritime Meteorology and Storm Warnings and for Weather Telegraphy in September.

358. Office Staff - The appointment of Mr. Gordon Dobson as Graduate Assistant (Minute 309) was continued until 31st March, 1913, the Master and Fellows of Gonville and Caius College having continued his studentship at the College.

Statistical Division (Minute 341) - Reported - that Mr. Rigby had returned to duty on April 11th, after 65 days of sick leave. It was agreed to authorise the purchase of an annuity of £112 10s, being one half of his regular salary, in consideration of his service in the Office since 1874, in accordance with No. 14 (1) of the Regulations for Appointments (Circular 002)

The Director was authorised to arrange for Mr. Rigby's retirement as from September 30th, 1912.

359. Supply of Instruments to the Navy (Minute 351) - Read the following letter and enclosure from the Director of Stores:-

M.O. 2,414.

Admiralty, S.W.,
24th June, 1912.

Sir,

With reference to your letter dated 5th June, 1912, No.NX 01/1658 (3) and to the discussion which took place at your office on the 7th idem, with a representative of this Department, in regard to the accounts of Admiralty instruments, I have to forward herewith a memorandum of the procedure proposed to be adopted in future in dealing with these instruments, and shall be glad to hear in due course whether these arrangements are concurred in so far as your Department is concerned. If so, the necessary instructions will be issued to the respective Dockyards, etc.,

2. If you see no objection it is proposed that the new system of quarterly returns, etc., shall take effect from the 1st October next.

I am, etc.,
JOHN FORSLEY,
Director of Stores.

The Director
Meteorological Office.

Mr. Lempfert

The subject for discussion on Monday next, October 16th will be : -

V.Bjerknes. "On the Dynamics of the Circular Vortex with Applications to the Atmosphere and Atmospheric Vortex and Wave-Motions. Geofysiske Publikationer Vol.II No. 4 pp. 1-88."

The discussion will be opened by Sir Napier Shaw, F.R.S.

Enclosure to Admiralty Letter, dated 24th June, 1912, N.S. 6892/9965.

MEMORANDUM SHOWING POINTS DISCUSSED AT METEOROLOGICAL OFFICE ON 7TH JUNE, 1912.

History Book.

(*a*) The history record of instruments (kept at M.O.) in future to contain information only as to the date of receipt from opticians, and issue to Dockyards or to H.M. ships (if supplied direct from M.O.), also date of receipt at M.O. of instruments returned from Yards for repair.

The intermediate transactions, *i.e.*, issue to ship and return from ship to Yard, no longer to be recorded therein.

The present form (M.O. 501) to be abolished, and the new form to be provided by the Admiralty.

Numbering of Instruments.

(*b*) Instruments to continue to bear maker's numbers, this course being essential in order that Kew certificates may be obtained. Maker's numbers will enable the instruments to be identified as Admiralty property.

Repairable or unserviceable Instruments.

(*c*) Defective or broken instruments to be dealt with as follows :—

Mercurial barometers and aneroids in all cases to be returned to M.O. for repair ; in no circumstances should they be disposed of locally.

Ordinary thermometers to be returned to M.O. for provision of new scales, if latter are broken but the tubes remain intact. If tubes are broken, tubes and scales to be destroyed locally as tube cannot be repaired, and scale becomes useless, scales being specially graduated for individual tubes.

Maximum and minimum thermometers. If tubes are broken, the frames to be returned to M.O. Allowance of about 1*s.* each was recently made for frames sent to opticians.

Hydrometers, if broken, to be disposed of locally.

Thermometer screens, if beyond repair on board ship, to be disposed of locally.

Issue Vouchers.

(*d*) M.O. vouchers for obtaining receipts from ships' officers will not be required under new system, and form will be abolished.

Invoices for Instruments sent from M.O.

(*e*) Arrangements to be made for invoices for instruments sent to Yards from M.O. to be forwarded in duplicate, and a form of receipt certificate will be added to form.

Vouchers for Instruments sent to M.O. for repair.

(*f*) Vouchers for instruments sent to M.O. for repair, &c., to be forwarded from H.M. Dockyards in duplicate at the same time as the instruments. Original to be retained at M.O., and duplicate to be receipted and returned to Yard.

Instruments destroyed.

(*g*) Information to be furnished to M.O. as to the makers' names and numbers of all instruments destroyed locally to enable the numbers to be finally cleared from M.O. records.

Carriage, freight and damage in transit.

(*h*) Instruments sent to Home Yards to continue to be consigned "carriage forward" at company's risk, rates payable being 50 per cent. above ordinary parcel rates. This course is understood to be the most economical in the long run. When instruments are damaged in transit, Yards to report to M.O. on Form N.S. 252 with a view to steps being taken by that Department to recover value from carriers.

Freight for instruments sent to foreign Yards to be requisitioned as at present by M.O. on Director of Transports, who, it is understood, arranges for shipment as Admiralty packages. Payment of freight charges arranged by Admiralty.

Office charges for conveyance of instruments to docks or railway stations to be claimed annually on Admiralty as at present.

It was agreed to approve of the changes, subject to consultation with the Hydrographer as to the identification of the instruments used in H.M. ships for the meteorological information contained in Navy logs, and extracted from time to time by the Office for the purpose of compiling marine charts.

360. *Director's Report and Accounts* :—

Office Staff.—Captain Hepworth has been absent on account of a surgical operation since June 11th.

International Meteorology (Minute 351).—The Director attended the meeting of the International Commission for Scientific Aeronautics at Vienna, which took place on May 27th and following days,

returning on June 1st for the lecture at the Royal Institution by Professor Willis L. Moore of the United States Weather Bureau. The meeting was remarkable for the acceptance of three propositions by Professor V. Bjerknes involving the adoption of C.G.S. units for the measure of pressure, dynamic metres for the measure of height, and pressure as the argument for tables of results of the upper air. The resolutions passed at the meeting are appended :—

RESOLUTIONS OF THE INTERNATIONAL COMMISSION FOR SCIENTIFIC AERONAUTICS AT THEIR SEVENTH MEETING AT VIENNA, 28th MAY to 1st JUNE, 1912.

1. The Commission is of opinion that an attempt should be made next year to investigate distinct weather conditions by means of simultaneous ascents ; for this purpose telegrams will be sent from the central station recommending ascents.

2. The Commission is of opinion that the international days, employed hitherto, should be retained without detriment to a modification of the serial ascents. It is desirable that the serial ascents should be augmented by the introduction of a few two-day serial ascents.

Note.—If a station is unable to carry out all the ascents it would be better, in the first place, to participate in the long serial ascents.

3. It is the unanimous desire of the Commission to adhere to the St. Petersburg resolution that simultaneous ascents should be made at the time to which the morning weather charts refer. A subsequent rule of strictly simultaneous ascents is held in reservation.

4. The Commission is of opinion that ascents cannot be made simultaneously. It would, therefore, be desirable, in order to eliminate at least the influence of the diurnal range, for ascents in Canada to be made also during the morning of the same day. (Reference to St. Petersburg resolution.)

5. The Commission is of opinion that on days of the three small serial ascents, arrangements should be made for ascents to take place not only at 8 a.m. but also at the time of midday observations. Attention is called to the fact that at 2 p.m. danger of radiation is especially great. Every remedy should be applied in order to render errors due to radiation as small as possible.

6. The Commission resolves :—In the publications of the International Commission pressure should be expressed in bars or in decimal parts thereof, decibars, centibars, or millibars, instead of in mm. Hg. ; this resolution, however, will come into force only when the International Meteorological Committee has signified its approval.

7. The Commission resolves :—In the publications of the International Commission dynamic height measured in dynamic metres should be given in place of geometrical height measured in ordinary metres.

8. The Commission resolves that in its publications heights should be given in which the following pressure values are found :—1000 mbar (=750 mm. Hg.), 900 mbar (=675 mm. Hg.), 800 mbar (=600 mm. Hg.), 700 mbar (=525 mm. Hg.), 600 mbar (=450 mm. Hg.), 500 mbar (=375 mm. Hg.), 400 mbar (=300 mm. Hg.), 300 mbar (=225 mm. Hg.), 200 mbar (=150 mm. Hg.), 100 mbar (=75 mm. Hg.). The 1st January, 1913, is the date on which this comes into force.

9. The Commission is of opinion that the column "Ventilation" should be omitted from the forms of registering balloon ascents, the corresponding entry, however, should be made in the Remarks column instead.

In the column, thus left vacant, should be entered the computed rate of the balloon's ascent, calculated step by step, from which conclusions can be drawn as to the vertical movement of the atmosphere.

10. The Commission resolves, that also height and the lowest value of temperature of descent should be given in the forms of registering balloon ascents, as the rapid variations at the boundary of the stratosphere are of utmost importance for synoptic work.

11. The Commission thanks Herr Hildebrandt, the founder, and especially Mr. Patrick Y. Alexander, the generous donor of Rostock Aerial Observatory, for their success in establishing an aeronautical station of this kind which will co-operate in the work of the International Commission, and above all contemplate the installation of measurements of atmospheric electricity also in the upper air.

12. The Commission was much interested in the report of Herr Galbis that it is intended to erect, by Royal command, permanent ærological observatories in Spain as well as in Teneriffe. The Commission desires to express its most grateful thanks to the Spanish Government for this splendid furtherance of its work. It is also grateful for the support given to the work of the Observatory of the International Commission on the Cañadas under the direction of Dr. Wenger, and hopes that this station will continue to receive energetic support under the new management of Dr. Wolff and Dr. Lomas. The Commission thinks it most important that the new Observatory of the Spanish Government and the already existing one of the International Commission on the Cañadas should work together for a time in order that an uninterrupted transition of both series of observations may be assured.

13. In consideration of the importance of ærological investigations in high northern latitudes, the Commission reiterates the desire that the Danish, Norwegian, and Swedish Governments should do their utmost to promote ærological investigations also in their countries (especially in Iceland). Above all it hopes for the support of these Governments in the installation of the proposed new net-work of pilot balloon stations.

14. The Commission notes with great pleasure the successful endeavours of M. Morandi, Director of the Meteorological Institute of Montevideo, to assist in the exploration of the upper atmosphere in South America ; it declares its entire approval of the work of M. L. Morandi, so worthy of receiving encouragement and, while including M. L. Morandi among the Members of the Commission, it hopes that the Government of Uruguay will give every support and the means necessary for accomplishing the international ærological service in that country.

15. The Commission thanks Mr. Davis for the installation of an aerological service in the Argentine, and has received the first international aerological observations from South America with much gratitude and interest.

16. In the opinion of the Commission it is most necessary that the aerological work carried out on the Adriatic should be conducted with greater zeal.

17. The thanks of the International Commission for Scientific Aeronautics are conveyed to the Bulgarian Government for the proposed carrying out of pilot balloon ascents, with the hope that it will show even keener co-operation in the work of the Commission by the introduction of registering balloon ascents on international days; likewise it hopes for a connexion with the international network of pilot balloon stations.

18. The Commission resolves :—Cloud observations (Scale 0–10) should be made at a large number of stations every three hours, namely at 7 a.m., 10 a.m., 1 p.m., 4 p.m., and 7 p.m. (West European time) on days of International serial ascents. If the sky is only partially covered, orientation of the clouds in the sky should be given by a simple diagram.

Note.—If there are no clouds at the fixed hours, observations should be made in the interim. Strictly synchronous time is impossible in Russia, where local time is still employed.

19. With regard to cloud observations, only measured clouds should in future be published *in extenso*, as these alone give a picture of circulation in the atmosphere. Those not measured should be entered under " Remarks."

20. The Commission desires that in every European State a systematic network of pilot balloon stations should be established, making, by means of a theodolite, a daily observation between 11 a.m. and 1 p.m., of a pilot balloon of which the rate of ascent is known. To begin with, the net-work of stations should not be too dense. The Commission is of opinion that the arrangement of this net-work is of the utmost importance both scientifically and for practical purposes.

21. In the opinion of the Commission it is desirable, also in the interests of aeronauts, that pilot balloon observations at aerodromes be carried out systematically under the direction of experts, and the data placed at the disposal of the Commission, in accordance with the resolutions of the International Commission for Scientific Aeronautics, endeavour being made to reach the greatest possible heights.

The President is instructed to communicate this resolution to the International Aeronautical Association.

22. The International Commission for Scientific Aeronautics, convinced that the progress attained in sending up *ballons sondes* for scientific investigations justifies undertaking the study of air in the upper atmosphere, expresses the wish that samples of air should be obtained more frequently for the purpose of being analysed in chemical laboratories and thus assist aerological investigations.

23. The Commission considers that it would be opportune to make a revision of the properties of air between 1/2000 and 1/1000000 of atmosphere (1·5 mm. and 0·008 mm.).

24. The Commission desires that there should be a thorough investigation of the properties of water vapour at low pressures and at temperatures below 0° C., and its physical conditions in a state of supersaturation.

25. The Commission thinks it would be most advantageous to have a complete investigation made of aerological results obtained up to the present time, and above all that all the results of these investigations should be collected in the same publication.

26. The Commission was much interested on hearing of the fact that His Excellency, the Secretary of State for the Colonies, will support the establishment of a permanent aerological station on the Victoria Nyanza. It begs the President to take steps that this station may be in working order as soon as possible. The Commission offers its heartiest thanks to the Secretary of State for the Colonies for his energetic assistance.

27. The report of the President on the arrangements and work at the aerological stations in Teneriffe and Spitzbergen was received with much interest by the Commission. The working of these stations was only rendered possible by the energetic support of the German Government. The Commission offers its heartiest thanks to His Excellency, the German Imperial Chancellor, for his help and hopes that the important station in Spitzbergen will be maintained as long as possible.

28. The Commission has listened with much interest to the report of Colonel Vives y Vich on the scientific activity of the army aeroplane division in Guadalajara, and thanks the Colonel for the energetic assistance which he has always given to the work of the Commission, of which he is a member. The Commission requests him to convey these thanks also to the Spanish War Office, and hopes that the work of the Commission will be assisted also in future by the military section at Guadalajara.

29. The Commission recommends that those Institutes, which take part in the investigation of the atmosphere on international days, should be requested to publish as soon as possible on loose sheets the results thus obtained, eventually only those of *ballon sonde* ascents, in order that they may be sent in exchange to Institutes interested.

30. The proposals of Trabert and Stoll that :—

(*a*) The results of balloon observations, namely of registering balloons as well as of pilot balloons, should be published in similar form to that of temperature values in years past, namely in the usual steps with values of height in which abrupt changes of wind direction or velocity occur.

(*b*) In the calculation and printing of wind conditions, not only wind direction and force at different heights but also the co-ordinates of the horizontal projection of the trajectory should be given in future.

Remark :—The reconstruction of the trajectory is thus considerably facilitated and a simplification of scientific work achieved.

are adopted by the Commission with the corollary that they are to be communicated to the Editor of the publication only as a wish of the Commission, in order that he may use his judgment whether it is possible to print them.

31. The Commission desires that at aerological observatories the lowest layers of air should be studied as closely as possible, especially in regard to the formation of eddies and turbulent movements.

32. The Commission has already expressed the wish that an aerological observatory be established in Hungary. The Commission repeats this wish *apropos* of its meeting in Vienna, and begs that its fulfilment may be expedited as much as possible.

33. The Commission desires that aerological work may be carried out in accordance with the programme of the International Commission for Scientific Aeronautics, in connexion with the crossing of the Arctic region, planned by Captain Amundsen.

34. The Commission was much interested in the reports on the extremely valuable aerological work in Batavia, and offer their most grateful thanks to the Dutch, and especially the Indian Governments, as well as to all who assisted in this work—Messrs. van Everdingen, van Bemmelen, and Braak.

35. The Commission has heard with much pleasure M. Rykatcheff's communication that the Russian Government had presented the Douma with a scheme to create an aeronautical observatory near Pawlowsk, and aeronautical departments near the observatories at Tiflis, Ekaterinburg, Irkutsk, and Nijni-Ussurissky, near Vladivostock. It expresses the desire that this scheme be carried out as soon as possible. The establishment of the observatory and of the aeronautical departments is of the utmost importance for the achievement of the aims of the Commission.

Further, the Commission desires that the aerological work, which will be carried out next year in high northern latitudes by the expeditions of Captain Amundsen, the Swiss expedition, and the Danish expedition to explore Greenland, and by the aerological station of Spitzbergen, should be completed by aerological observations on the shores of the Arctic Ocean and the island of Nova Zembla.

36. M. Chistoni being under orders to proceed to Faënza on his departure from Vienna, the Commission begs him to place on their behalf a wreath on Toricelli's tomb.

Supply of information to the Press (Minute 334).—Thirty-six of the health resorts have come into the arrangement for repaying £4 a year to the office as the cost of inspection of their Meterological Stations, and the Form issued each evening to the press includes observations from 43 stations—34 in England, 5 in Wales, and 4 in Scotland. The new service began on 1st May.

Publication.—Marine Charts for the South Atlantic.—The following suggestion by the Marine Superintendent has been approved provided time can be found by the Staff of the Marine Division :—

Memorandum.—There appears to be a demand for a South Atlantic Pilot Chart, for in recent years applications have been made rather frequently for such an aid to safe navigation.

I beg leave to suggest that another edition of the Wind Charts for the South Atlantic, in atlas form, which would include currents, barometric pressure, air and sea temperature and trade routes, might be published with advantage.

All of the data necessary for the preparation of such an atlas are available.

Reports of work for May and June, 1912.—1. *Marine Division.*—Meteorological Tables for the Admiralty :—Completing China Sea Part III., and Eastern Archipelago ; Mediterranean Pilot Part I. in course of completion.

Winds of the North Sea and of the Skagerrak tabulated for the Admiralty.

Fifty new Meteorological Log books, three abbreviated Meteorological Log books, and one Lighthouse Register ; also 237 North Atlantic Registers, 128 Radio-telegraphy Registers, and 38 Indian Ocean Registers, dealt with on receipt.

Issues of North Atlantic Chart for June and July, 1912, published. Issue for August in course of preparation. Indian Ocean Chart for July published, August in the press, and September in course of preparation.

Minute 173 vii.—Monthly Circumpolar Charts for "Discovery Meteorology Part II," October, 1901, to March, 1904, passed for the press.

Extraction of observations relative to the Yellow Sea.

Extraction of observation in North Atlantic, north of 30°N., for Messrs. Spiers, Antwerp, at rate ordinarily charged, £3 10*s*.

The estimated cost, at rate ordinarily charged, of work done for Public Offices, £39.

2. *Forecast Division.*—(1) Current work has been kept up to date.

(2) Number of wireless messages has been :—

(*a*) From H.M. Ships, May, 9, June, 12.

(*b*) From ships of Mercantile Marine May, 482, June, 451.

(3) Corrections to Daily Weather Report for May prepared.

(4) Forecast Checking completed up to middle of February.

(5) Wind Frequency tables prepared up to end of April.

(6) Working Charts prepared for binding up to March 10th.

(7) Inquiries :

	May.	June.
Prepaid Replies	52	56
Other Telegraphic Inquiries	3	22
Wireless Inquiries	—	—
Telephone Inquiries	12	22
Personal Inquiries...	—	1

(8) The usual Summary of the results of the Storm Warning checking has been prepared for the Annual Report.

(9) The issue of Harvest Forecasts commenced on June 1st. Up to June 30th applications for daily forecasts were received from 44 persons, and applications for notification of conditions favourable for a spell of Fine Weather from 55 persons.

Mr. Sargeant was absent on Inspection Duty from May 20th—31st, Mr. Brodie from June 3rd—15th, and Mr. Harries from June 10th—22nd.

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, Part I., up to date. Part II., Issue for May waiting for maps. Part III., section 1, up to date; Part III., section 2, Annual Volume for 1911 completed; January, 1912, and introduction for 1912 ready. Part IV., section 1., Tables for 1911 completed; Values for January, 1912, ready. The summaries for 1911 for Aberdeen and Falmouth are in course of preparation.

The examination of the Observatory records, and Sunshine Cards, the tabulation of Cup Anemograms, and the summaries of pressure tube anemograms, have been kept up to date.

Library: 104 cards prepared for catalogue, 137 volumes of books and MS. returns for binding.

Inquiries as follows:—Newspapers, 16; Legal, 46; Scientific and Commercial, 94; Forecasts, 9; General, 3. The receipts in connection with these amounted to £24 0*s.* 8*d.*

Special Weather Notes have been issued to six agricultural shows.

4. *Instruments Division.*—The usual Admiralty and Office work.

A new 5-inch raingauge and minimum thermometer have been supplied to both Nairn and Yarmouth Telegraphic Reporting Stations, also a new minimum thermometer to Wick.

A small cup anemometer has been lent to the Commander of H.M.S. "Mutine" at Gibraltar for experimental purposes.

Six boxes have been sent for the return of Meteorographs, namely—Southport, Tilbury, Bishop's Waltham, Cork, Bourton, and Piddington.

Instruments have been supplied to the following against repayment:—

A. Watt, Esq., Edinburgh.	Manchester University.
Local Marine Board, Bristol.	H. Victor Prigg, Esq., Plymouth.
Chopwellwood College.	Nobel's Explosives Co., Ltd.
St. Andrew's District Council.	Capt. Hon. F.G.P. Butler, R.N., Knoppogue Castle.
G. Rossiter, Esq., Paignton.	Dr. Colborne, St. Leonards.
E. Kitchener, Esq., Hemel Hempstead.	Rev. C. Gelderd, Ushaw.

Two requisitions have been received from the Crown Agents for the Colonies, namely—Uganda and Jamaica.

Five requisitions are now in hand.

Publications.—Report for May and June from Clerk of Publications:—

—	May.		June.	
	Received.	Issued.	Received.	Issued.
Daily Weather Report ...	760	749	770	758
Weekly Weather Report ...	375	323	375	323
Monthly Weather Report, &c.	575 (April)	430	—	—
Do. do. (Maps)	25 (April)	2	—	—
Daily Readings	100 (Intro. Jan. & Feb.)	43	100 (Mar. & Apr.)	43
Geophysical Journal ...	325 (Oct.)	122	325 (Nov. & Dec.)	123 (Nov.) 126 (Dec.)
Hourly Readings—Meteorological.—Kew	375 (Dec.)	—	—	—
Eskdale	—	—	—	—
Valencia ...	250 (Dec.)	1	—	—
Monthly Meteorological Charts (Atlantic).	600 monthly to June (3).	664	600 monthly to July (3).	541
Monthly Meteorological Charts (Indian).	350 (June)	280	350 (July)	240
International Upper Air Observations.	—	—	50 (May & June, 1910).	28
Sixth Annual Report ...	—	—	—	—
Cloud Atlas	—	—	—	1
Observer's Handbook (1911)	—	11	—	8
"Forecasting Weather" ...	—	—	—	—
"Structure of the Atmosphere in Clear Weather."	13	8	—	—
Geophysical Memoirs, No. 1	—	—	600	25
No. 2	—	—	600	34
No. 3	—	—	600	25

Receipts from sales at M.O.—May, £1 9*s.* 8*d.*—June, £1 7*s.* 6*d.*

New publications.—Geophysical Memoirs: Copies of Memoirs Nos. 1, 2, and 3 have been received and are being issued. No. 4 has been signed for press. Barometer Manual: Proof of the letterpress of the seventh edition has been received. Hourly Values—Geophysical Section:—Printing of the hourly magnetic tabulations for Eskdale is proceeding. Geophysical Journal, 1912: Copy for the introduction and January number has been sent to the Stationery Office. The monthly issue is enlarged by 2 pp. containing results of observations for the upper air.

M.O. Press.—During the two months ended 30th June, 1912, the issue of the Periodical Publications has been as follows, namely :—

Daily Weather Report.—As contract, except on one occasion when the stone broke.
Weekly Weather Report.—As contract.
Monthly Weather Report.—As contract.
Monthly Meteorological Charts, North Atlantic.—As contract.
" " " Indian Ocean.—As contract.

On 1st May, 1912, there were eight requisitions for forms, diagrams, &c., outstanding. Since that date five requisitions have been issued and seven discharged, leaving six requisitions still in hand.

The repairs to the old printing press have been completed, and both presses are now in working order.

Some complaints have been received with regard to the noise occasioned by the working of the new machine, and H.M. Office of Works have taken steps to remedy the defect.

Observatories.—Reports of work for May and June.—Kew.—Meteorology.—The usual work and tabulations. International cloud observations, six days. The float of the Dines pressure-tube recorder has been sent to Munro for repairs, and a new recorder, received for use with the direction-velocity anemometer shortly to be erected on trial, has been temporarily substituted.

Magnetism.—Absolute observations on nine days. Quick runs in connexion with the Australasian Antarctic expedition were taken on four days. Three observations of horizontal force have been made with the unifilar magnetometer No. 140, and two observations of inclination with dip circle No. 120.

Electricity.—Absolute observations of potential gradient on 43 days. Observations with Ebert apparatus on 26 days, with Wilson apparatus on 27 days. The battery of the electrograph has been taken down, cleaned and put in order, and a new determination has been made of the scale value of the instrument.

Solar radiation.—Ångström observations on 22 days.

Seismology.—A scale value determination of the Seismograph has been made.

Publications.—Data for Geophysical Journal for February prepared. Quiet day magnetic inequalities for Eskdale, 1911, have been prepared as far as possible.

Supplies.—Photographic paper has been supplied to the India Office and to Oxford and Eskdale observatories.

Eskdale.—Buildings.—The sanitary arrangements were inspected by the Office of Works.

Staff.—The mechanic and housekeeper left on 18th May. The Superintendent, acting on medical advice, left for a holiday on June 7th, and Mr. Southerns is now in charge. Mr. Jamieson arrived from Edinburgh on June 14th as clerk-substitute for members of the staff away on leave. On June 24th Mr. and Mrs. Lowe came for a month's trial as mechanic and housekeeper. They proved unsuitable, and left on the 29th.

Meteorology.—Usual observations and tabulations.

Magnetism.—Usual work. Experiments with the new vertical force recorder have been continued, and appear to be satisfactory. The vertical component magnetograph was adjusted on June 26th.

Seismology.—Two large earthquakes occurred in May, and excellent records were obtained by the Wiechert instrument. The Omori also recorded both, but on the first occasion the needle was dislocated, on account of the violence of the motion. The two horizontal component Galitzin Seismographs were standardised on May 15th. The west component instrument had changed considerably, the north very little. Readjustment and restandardisation of both was made on the 20th.

Electricity.—The electrometer with a new arrangement for recording a zero about once in three hours has been working satisfactorily. No observations with Ebert's apparatus have been obtained.

Solar radiation.—No observations.

Branch Office.—Mr. J. S. Dines's Report of Work for May and June.—Eight pilot balloons have been sent up.

Three observations have been made on a tethered balloon.

During a visit to Southport in connection with a meeting of the Royal Meteorological Society I was enabled to take some quick runs on the anemograph at Marshside by permission of Mr. J. Baxendell, the Borough Meteorologist.

Some glass scales have been engraved for use with the two new self-recording theodolites.

Slight alterations have been made to the direction recorder.

Some tests have been carried out on the possibility of over-run on a pressure tube anemometer when fitted with one-inch connecting pipes, and a report on the results obtained has been prepared. In connection with this work two experimental suction heads have been made.

The anemometer has been running throughout the period.

An abstract has been made of the results obtained by Miss White from the series of kite and captive balloon ascents at Glossop.

A diagram and photographs have been prepared to illustrate the wind currents met with behind a building in a natural wind.

A curve has been drawn, based on data previously obtained, to show the change of gustiness with height above the ground.

Wise has assisted in the observational work and made the necessary apparatus for the over-run experiments on the pressure tube recorder. The rest of his time he has devoted to work for the Meteorological Office.

List of Instruments, &c., lent by the the Meteorological Committee to the Science Museum, South Kensington.—4th August, 1892 :—1 Barometer, Negretti M.O. 223 ; 1 Barometer, Adie B.T.. 171 ; 2 Thermometers, 3,267, 3,360 ; 1 Maximum Thermometer, 1,561 ; 1 Minimum Thermometer, 1,533 ; 1 Stevenson Screen ; 1 8-in. Raingauge, Casella M.O. 372 ; 1 8-in. Raingauge glass, M.O. 1,388 ; 1 Thermometer in copper case, B.T. 4,208 ; 1 Hydrometer, Casella B.T. 717, and glass to float it in.

9th July, 1894 :—Milne's Barograph ; Hand Anemometer M.O. 32 ; Harris Wind Gauge ; Balloon Thermometer, 46,561 ; 2 Sunshine Bowls, M.O. 88, 89 ; Marine Barometer, Bate↑ 26.

1895 :—Galton's Pantagraph.

1906 :—Galton's Vapour Tension Instrument.

11th November, 1908 :—5 old Barometers by Pastorelli, Jones, Sargent, Dennis, Newman ; 5 Hydrometers (various patterns) ; Sympiesometer ; 4 Old spirit Thermometers ; Old Mercurial Thermometer ; 2 deep sea Thermometers, each in copper case ; Actinometer ; the first spherical lens for use in Sunshine Recorders ; Dines Kite and Meteorograph ; Ballon-sonde with accessories.

April, 1912 :—Bridled Anemometer lately returned from Holyhead ; 4 curves from Holyhead—Bridled Anemograms, 19, 40, 1906 : P.T. Anemograms, 19, 40, 1906 ; 11 Frames, containing sample curves of Seismograms and Magnetograms, as follows :—*Atmospheric Electricity :* Records of varying positive potential gradient at Kew Observatory ; Records of varying positive potential gradient with occasional excursions to the negative side ; Records with the water dropper and Dolezalek electrometer at Eskdale Observatory. *Terrestrial Magnetism* : Kew Records of Declination and Horizontal Force ; Kew Records of vertical Force ; Photograph of Eskdalemuir, Dumfries-shire ; Records for Kew Observatory (horizontal force and declination) and at the new Observatory at Eskdalemuir ; Magnetic Records from the Antarctic. *Seismology :* Records of Earthquakes obtained at Kew Observatory by the Milne Seismograph (2 frames) ; Photographic copy of the record of the Turkestan Earthquake of 1911, obtained at Eskdale Observatory ; 1 large Oak Show Case and Stand.

Accounts.—Newspaper Weather Bureau.—Reported, that Mr. Diehl of the Newspaper Weather Bureau was in arrear on account of the information supplied, to the extent of £30 2*s.* 8*d.*, and had written on July 2nd explaining that, owing to the recently issued reports from health resorts to the Press, he was unable to pay at the present moment.

It was ordered that in future he should be required to pay in advance.

Travelling Expenses.—The Director's travelling expenses were authorised as follows :—

	£	*s.*	*d.*
Vienna—International Commission	22	10	5
Hull—Inspections	7	5	6

Observatories.—Statement of Accounts for the Quarter ended 30th June, 1912 :—

KEW.

1911.			*Receipts.*	1912.		
£	*s.*	*d.*		£	*s.*	*d.*
234	10	7	Gassiot Trust	—		
93	15	0	National Physical Laboratory ...	93	15	0
2	10	0	Grazing Rents	2	10	0
23	8	0	Miscellaneous	26	8	3
107	3	0	To Balance	327	1	2
£461	6	7		£449	14	5

1911.			*Payments.*				1912.		
£	*s.*	*d.*		£	*s.*	*d.*	£	*s.*	*d.*
206	10	10	Superintendent				206	10	10
100	7	9	Assistants				104	4	0
20	7	6	Caretaker				22	14	9
4	5	0	Sundays and holidays ...	4	10	0			
27	18	6	Overtime	23	12	9			
							28	2	9
25	6	11	Rent, fuel, and lighting				23	19	6
—			Repairs					8	8
—			Insurance				6	5	0
18	15	6	Materials				21	11	0
32	9	5	Instruments				15	4	5
—			Books, printing, and stationery					—	
25	5	2	Incidental expenses ...				20	13	6
£461	6	7					£449	14	5

ESKDALE.

1911.				1912.		
£	*s.*	*d.*		£	*s.*	*d.*
500	0	0	Royal Society (Parliamentary) Grant)	—		
—			Salary of Assistant in Seismology to 31st March, 1912	108	6	8
4	0	0	Miscellaneous	14	19	4
—			To Balance	220	13	11
£504	0	0		£343	19	11

1911.			*Payments.*				1912.		
£	*s.*	*d.*		£	*s.*	*d.*	£	*s.*	*d.*
100	0	0	Superintendent				100	0	0
61	17	6	Assistants				117	5	0
27	6	0	Mechanic and Caretaker				18	18	0
13	0	0	Handyman				13	0	0
3	3	3	Books, stationery, &c. ...				1	18	3
1	3	8	Insurance				4	17	6
10	6	0	Travelling expenses ...				2	6	2
			Incidental expenses :—						
27	15	0	Rental of private wire	—					
8	0		Instruments and repairs	—					
10	15	3	Photographic paper ...	16	14	10			
—			Coals and carriage of coals, light	—					
—			Repairs, &c.	61	14	4			
6	13	0	Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	7	5	10			
							85	15	0
241	12	4	Balance in hand ...	—			—		
£504	0	0					£343	19	11

VALENCIA.

1911.				1912.		
£	*s.*	*d.*		£	*s.*	*d.*
—			Royal Society (magnetic observations)	36	2	6
8	15	0	Grazing Rent	8	15	0
105	6	3	To Balance	122	6	8
£114	1	3		£167	4	2

1911.			*Payments.*	1912.		
£	*s.*	*d.*		£	*s.*	*d.*
68	15	0	Superintendent	68	15	0
30	15	0	Assistants	30	5	0
—			Magnetic observations	36	0	0
—			Rent, rates, and taxes		—	
—			Private wire	13	5	0
14	11	3	Miscellaneous expenses	18	19	2
£114	1	3		£167	4	2

Submitted—The following Statement of Accounts for the Quarter ending 30th June, 1912 :—

RECEIPTS.						PAYMENTS.					
1911. £ s. d.		£ s. d.	£ s. d.	1912. £ s. d.		1911. £ s. d.		£ s. d.	£ s. d.	1912. £ s. d.	
1,298 16 3	Balance from year 1911–12	—	404 6 4			250 0 0	Director	—	250 0 0		
4,212 10 0	Parliamentary vote	—	4,250 0 0								
	M.O. OBSERVATORIES :					1,929 2 9	OFFICE SALARIES : Monthly	1,877 11 3			
354 3 7	Kew	122 13 3				164 10 8	Weekly	243 0 8			
504 0 0	Eskdalemuir ...	123 6 0								2,120 11 11	
8 15 0	Valencia	44 17 6				461 6 7	M.O. OBSERVATORIES : Kew	449 14 5			
—	Farnborough ...	200 0 0				262 7 8	Eskdalemuir ...	343 19 11			
			490 16 9			114 1 3	Valencia	167 4 2			
	DEPARTMENTAL EXPENSES REPAID :					—	Farnborough ...	73 10 0			
53 19 0	Forecasts, &c. ...	49 4 2								1,034 8 6	
30 8 5	Marine, Statistics, and Observatories	33 10 8				170 17 6	OFFICE EXPENSES : Rent, Fuel, &c. ...	178 10 10			
8 16 2	Instruments ...	14 3 5				264 10 10	Furniture, Fittings, &c....	110 11 3			
			96 18 3			124 9 5	Incidental	133 11 7			
	INCIDENTAL EXPENSES REPAID :									422 13 8	
85 18 1	Forecasts, &c. ...	97 7 9					POSTAGE AND TELEGRAMS :				
19 12 8	Other Branches ...	18 10 10				75 17 11	General Postage ...	73 14 10			
11 17 11	Stationery Office Account ...	10 13 9				87 4 8	Postage of Daily Weather Reports...	90 12 4			
			126 12 4			674 12 3	Telegrams, &c. ...	642 4 8			
	TELEGRAPH CHARGES REPAID :									806 11 10	
146 14 6	Home	80 10 4					TRAVELLING EXPENSES				
76 0 0	Telegrams sent abroad	40 19 7				65 11 0	AND INSPECTIONS ...	—		102 10 5	
			121 9 11			258 0 0	SUPERANNUATION ...	—		337 1 3	
	INSTRUMENTS :										
1 10 0	Royal Navy ...	7 10 0					COST OF INSTRUMENTS :				
288 6 10	Mercantile Marine, Stations, &c. ...	625 16 0				88 8 2	Royal Navy	175 2 11			
			633 6 0			354 2 1	Mercantile Marine, Stations, &c. ...	513 18 1			
	OBSERVATORY										
32 18 6	FORMS, &C. : ...	—	35 8 6							689 1 0	
—	INSPECTIONS ...	—	76 0 0			482 10 2	AUXILIARY OBSERVATORIES, &C. : ...	—		439 15 1	
	SUPERANNUATION ACCOUNT :										
141 5 0	Annuities... ...	178 15 0				68 0 5	LECTURES AND EXPERIMENTS ...	—		87 10 0	
22 10 4	Interest on Investments	13 4 10									
—	Income Tax returned	8 15 0				1,599 11 4	BALANCE : Cash at Bank ...	251 6 11			
			200 14 10			48 7 6	,, at Office ...	30 1 6			
245 9 11	LECTURES AND EXPERIMENTS ...	—	135 19 2							281 8 5	
£7,543 12 2			£6,571 12 1			£7,543 12 2				£6,571 12 1	

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
1,543 19 11	To sundry creditors	1,544 8 4		1,647 18 10	By cash at Bank and at Office ...	281 8 5	
23 18 2	,, salaries reserved	—		111 18 2	,, Admiralty	192 12 11	
67 6 3	,, superannuation	—		267 17 5	,, M.O. instruments in stock ...	501 1 10	
893 13 7	,, balance	173 2 6		501 3 6	,, sundry debtors	742 7 8	
£2,528 17 11		£1,717 10 10		£2,528 17 11		£1,717 10 10	

NOTE.—On 30th June the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £2,119 5*s.* 11*d.*

Submitted—The following statement :—

	£	s.	d.
Bank balance on 30th April, 1912	3,425	19	1
Receipts from 1st May to 30th June, 1912	1,318	10	8
	4,744	9	9
Cheques drawn from 1st May to 30th June, 1912	4,493	2	10
Bank balance on 30th June, 1912	£251	6	11

FORTY-FOURTH MEETING.

South Kensington, S.W., 2nd October, 1912.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	MR. MIDDLETON.
THE HYDROGRAPHER.	DR. SCHUSTER.

361. The Minutes (352–360) of the last Meeting (3rd July, 1912) were read and confirmed.

362. *National Insurance Act* (Minute 354).—Reported—the following correspondence :—

From the Meteorological Office to the Insurance Commission (England).

W. 14. 4th July, 1912.

National Insurance Act: Schedule I., *Part* II. (*b*).

SIR,

THIS Office has in its employment 84 persons, of whom 69 are on the Clerical Staff and 15 are classed as Messengers, &c.

Of the Clerical Staff 30 are in receipt of salaries of more than £160 per annum. The remainder of the Clerical Staff, together with the Messengers, &c., in all 54 persons, are receiving salaries or wages from the Office of £160 or less.

The Office is now under the control of a Committee constituted by Minutes of the Lords Commissioners of H.M. Treasury, dated 20th May, 1905, and 31st March, 1910, and the funds for the carrying on of the work of the Office are provided by Parliament in the shape of a Grant in Aid.

The terms of employment are set out in the accompanying paper of regulations for appointments. In order to regulate the procedure on certain points not provided for in the regulations as printed, the Committee have adopted certain additions which are shown in red ink.

On the ground that the provisions thus set out are "on the whole not less favourable than the corresponding benefits conferred by Part I. of this Act," the Meteorological Committee have desired me to ask that the employees of this Office in the following categories be excepted in accordance with Schedule I., Part II. (*b*) :—

Classified Clerks,
Women Clerks,
Clerk Assistants,
Office Keepers,
Supernumerary Clerks subject to deduction for Superannuation.

With the exception hereafter mentioned, the Committee propose that the employees who are not included in these categories should come under the operations of the Act in the usual way.

The exception referred to is concerned with the category of Graduade Assistants, who are University Graduates receiving an honorarium. The Committee propose that they shall, if they wish, obtain exemption individually on the ground that they are not dependent on their employment.

I am, &c.,
W. N. SHAW.

The Secretary,
National Health Insurance Commission,
Westminster, S.W.

Reply.

National Health Insurance Commission (England),
Buckingham Gate,
London, S.W.,
19th July, 1912.

M.O. 2747.

SIR,

WITH reference to your letter of the 4th instant, applying for certificate of exception under paragraph (*b*) of Part II. of the First Schedule to the National Insurance Act in respect of certain persons employed by the Meteorological Committee, I am directed by the National Health Insurance Commission (England) to enclose a copy of the Commissioners' circular letter of the 22nd May, together with copies of the forms to be used in making application for a certificate under that paragraph.

I am at the same time to enquire whether the Commissioners are right in assuming that in the absence of any special reason to the contrary (such as unsatisfactory service rendered by the officer retiring) the maximum pension allowed under rule 14 (4) is ordinarily granted, and that the full period of sick leave allowed by rule 21 is ordinarily granted except in cases of disease or disablement caused by misconduct.

With reference to the last paragraph of your letter, I am to point out that where a person employed within the meaning of the Act obtains a certificate of exemption under section 2, such a certificate will not relieve his employer of the obligation to pay the same contributions as would have been payable as employers' contributions if the worker had been an insured person.

I am, &c.,
JOHN ANDERSON.

The Director,
Meteorological Office,
South Kensington,
London, S.W.

M.O. to Insurance Commission.

2747, W. 14.

22nd July, 1912.

SIR,

I BEG to acknowledge the receipt of your letter of the 19th instant, having reference to the application by the Meteorological Committee for the exception of this Office from the operation of the National Insurance Act under paragraph (*b*) of Part II. of the First Schedule, and in reply to enclose Forms X. 17, X. 20 and Y. 18, A., B. and C., duly filled up as requested.

With regard to paragraph 2 of your letter, I beg to say the Commissioners are right in the assumption therein set out, viz.: "that in the absence of any special reason to the contrary (such as unsatisfactory service rendered by the officer retiring) the maximum pension allowed under rule 14 (4) is ordinarily granted, and that the full period of sick leave allowed by rule 21 is ordinarily granted except in cases of disease or disablement by misconduct."

The information in the third paragraph of your letter is duly noted.

I am, &c.,
W. N. SHAW.

The Secretary,
National Health Insurance Commission,
Buckingham Gate,
London, S.W.

Treasury to M.O.

M.O. 2811.

Treasury Chambers,
23rd July, 1912.

SIR,

I AM directed by the Lords Commissioners of His Majesty's Treasury to transmit the enclosed copy of: (1) the First and Second Reports of the Inter-departmental Committee on Employment under the Crown as affected by Part I. of the National Insurance Act, 1911; (2) of Treasury Minutes of 8th June and of 4th instant thereon.

In paragraph 9 of their second Report, the Committee recommend that copies of their reports be communicated to those authorities by whom persons are employed who are paid not out of moneys provided by Parliament but out of endowment or other public funds, and that the several authorities should take such action as they may consider necessary to obtain exception from the operation of Part I. of the Act in respect of their established pensionable officers and to secure the application of Sections 47 or 53 (2) to the cases of those of their employees whom they may wish to bring under those sections.

I am, &c.,
T. L. HEATH.

The Director,
Meteorological Office.

Insurance Commission to M.O.

National Health Insurance Commission (England),
Buckingham Gate,
London, S.W.,
1st August, 1912.

M.O. 2747 (2).

SIR,

WITH reference to your letter of the 22nd instant, enclosing form of application for Exception under Part II. (*b*) of the First Schedule to the National Insurance Act, and the accompanying Schedules together with extracts from the Regulations of the Meteorological Committee as to appointments, I am directed by the National Health Insurance Commission (England) to enquire, in regard to the Classified Clerks on Schedule A., whether they correctly understand that no provision as to disablement allowance is made should the services of such a clerk be dispensed with owing to ill-health before he has reached the age of 65, unless he has completed 20 years of service since reaching the age of 25.

With regard to the Women Clerks, Supernumerary Clerks and Office Keepers included on Schedules B. and C., I am to state that the Commissioners could not issue a certificate of exception in respect to them as no provision for allowances corresponding to disablement benefit appears to be secured in their case.

I am, &c.,
L. G. BROCK.

The Director,
Meteorological Office,
South Kensington,
London, S.W.

Reported further— the receipt on 2nd October, 1912, of a Circular X 9, 35127, reminding that " unless the Commissioners grant a certificate by 14th October it will not be possible to arrange for a refund of the contributions already paid."

It was agreed to complete the regulations for the superannuation of classified clerks, Regulation 14 (4), by making provisions for *an allowance in case of total disablement of one-sixtieth of the average salary of the past two years for each two years of approved service up to* 20 *years*, and providing *an allowance of* £13 *a year for any classified clerk not under the age of* 21 *years who has been in the service of the office for two years and becomes totally disabled.*

Read—M.O. 3597 from T. Fegan, the observer at the telegraphic reporting station at Birr Castle, asking whether insurance contributions were payable on his account.

The station at Birr Castle has been in continuous connexion with the Office since its work began in 1867, and has been associated with Lord Rosse's observatory. Until last year two stations were maintained; a climatological station which was voluntary and kept 9 a.m. and 9 p.m. hours, and a telegraphic reporting station which kept 8 a.m. and 6 p.m. and for which the usual payment was made. Both stations were in the charge of Dr. Boeddicker, Lord Rosse's observer. The present Lord Rosse takes less interest in the observatory than his predecessors did, and in 1911, after some correspondence which eventuated in the transfer of the hour of observing to 7 a.m., the climatological observations were given up, and in the climatological reports Birr Castle was replaced by Limerick (Mungret College). Some difficulty was experienced by Dr. Boeddicker in obtaining the services of an observer for the telegraphic work, and ultimately T. Fegan, a Police pensioner, was appointed. Presumably he is not in Lord Rosse's service as previous observers have been, and the meteorological work may be his only remunerative employment.

The question has not been raised by the observers at any of the other stations connected with the Office.

It was agreed that a letter of enquiry be written to the National Insurance Commission, Ireland (W. 14, 3597, 12th October, 1912).

363. *Meteorological Office Observatories* (Minute 356).—*Eskdalemuir.*—Reported—(i) That the report of the Meteorological Committee dated 16th May, 1912 (Minute 356), had been before the Gassiot Committee on 12th June and again on 25th July, together with a report upon it of a sub-committee consisting of the Astronomer Royal, Sir G. H. Darwin, Dr. A. Schuster and the Director of the Meteorological Office, containing certain recommendations in reply to the request for advice. The recommendations had been approved by the Gassiot Committee, with a modification of paragraph 2, and the minutes of the meeting had been printed and circulated to the members of the Gassiot Committee.

The superintendents of the observatories were therefore cognisant of the proceedings as members of the Gassiot Committee. The Superintendent of Eskdalemuir had notified his intention of seeking an appointment elsewhere and had asked for a reference in the case of one application and a testimonial for another. But there had been no formal reply to the Office letter from the Gassiot Committee and no official action had been taken towards carrying out its advice.

It was agreed that no official action be taken in the matter until after the next meeting.

(ii) That Mr. L. Southerns, professional assistant in Seismology at Eskdalemuir, had notified (M.O. 3611) his acceptance of an appointment as lecturer in Physics in the University of Sheffield, and had enclosed a letter from the Principal of the University asking that he would mention the earliest date at which he could take up his new duties.

It was agreed that, notwithstanding the conditions of three months' notice, Mr. Southerns should be allowed to leave the service of the observatory as soon as the work could be provided for.

The Director reported that he had received a letter (M.O. 3694) dated 26th September, 1912, from Mr. L. H. G. Dines, M.A., A.M.I.C.E., of Emmanuel College, Cambridge, elder son of Mr. W. H. Dines, expressing his wish for a post at Eskdalemuir. He had taken a degree in the Mathematical Tripos and the Mechanical Sciences Tripos at Cambridge, and after serving as an articled pupil at the G.W.R. Works at Swindon, was now engaged as draughtsman with a firm of mechanical engineers at Leiston, Suffolk.

It was agreed that the Director be authorised to write to the President of the Royal Society for provisional authority to appoint Mr. L. H. G. Dines for the remainder of the term for which funds have been provided by the Royal Society, *i.e.*, until 15th September, 1913, the appointment to be on the same terms as that of Mr. Southerns and subject to the approval of the Gassiot Committee at their next meeting.

Kew.—Reported—M.O. 3633/2 from Dr. Chree asking for authority to provide additional assistance for Mrs. Corrin and for the daily observations during the illness of her husband the caretaker and observer, who was suffering from internal lesion and was under observation by a doctor with a view to an operation.

Approved.

364. *Auxiliary Observatories.—Falmouth* (Minute 345).—The Director reported that as Secretary of the Committee of the British Association for Magnetic Observations at Falmouth Observatory he had attended the Meeting of the Association at Dundee, 4th to 11th September, for the purpose of presenting to Section A the final report of the Committee.

Mr. Wilson Lloyd Fox, Secretary of the Observatory Committee of the Royal Cornwall Polytechnic Society, had proposed to the Committee the addition to the report of the following resolution :—

> " The Committee hope that with a view to assisting the appeal for a Treasury " Grant for the Falmouth Observatory, a resolution may be passed by Section A " recommending that in the interests of science Falmouth Observatory may be " efficiently continued."

In view of that proposal a letter had been written inviting an expression of opinion from Sir Arthur Rücker, to which the following reply was received :—

Marine Hotel,
Lossiemouth, N.B.,
2nd August, 1912.

MY DEAR SHAW,

I HAVE not been well and have just left Harrogate, and am now recuperating here. I am without any books and cannot therefore do more than give a general opinion. There are two tasks for which observatories are important from the point of view of getting a magnetic map of the earth, apart altogether from the detailed study of minor variations in the magnetic elements. For determining the terrestrial lines in broad outline there is no doubt that some existing observatories could be dispensed with. They are too crowded in some places, too thinly dispersed in others. I have not done any work, say of the type of Adolph Schmidt, on this point, and should gladly submit to the opinion of himself and others as to how many observatories are wanted in England for this purpose.

The second class of question to be dealt with is the much more minute investigation of a specified area, in fact surveys of the type of my own and Thorpe's. I think I may say that we were the first to trace in great detail the curious lines to which the needle is attracted, and which run across the surface of the country quite independently of the nature of the surface geology. These disturbances may be produced by underground magnetic rocks, and I showed that large masses of rock with permeabilities no greater than that of basalt or gabbro would produce disturbances of the order of magnitude of those we observed. I therefore lean to the view that they are caused by such rocks.

But there is no conclusive proof that they may not be due to electric currents. In any case we know that the magnetic state of the earth is in a state of flux, and it is quite possible that light may be thrown on the cause of this phenomenon by determining whether the much smaller local disturbances are constant or whether they too change, and if so whether there is any connection between the ordinary secular change and the (at present) hypothetical alterations in local attraction. This question can only be solved by surveying the same area twice over at a sufficient interval of time. Originally I was inclined to think that a much larger interval than has passed since the epoch of our survey ought to elapse before it was repeated, but a year or two ago I went into the matter rather carefully on the occasion of Bauer's visit to England, and then formed the opinion that a good deal might be learnt by repeating it now.

I also feel sure that no trustworthy comparison could be made unless the number of stations in the new survey, was at least equal to that of the stations in the first part of our survey, *i.e.*, 200. Probably it would be desirable to make the number greater. It is also important that the new survey should be comparable in accuracy with our own. I wish therefore to say that the existence of more than one permanent observatory during the progress of the survey is necessary not only or even chiefly to get the corrections for a diurnal variation accurate, but on account of the great variation in secular change between the South of England and the North of Scotland. A table is given in the second volume of the survey showing the secular variation in five years at (I think) the intersection of every line of latitude and longitude indicated by whole

degrees. The change from North to South varies so considerably that Eskdalemuir would be of little use for the Channel, and I very much doubt if interpolations between Eskdalemuir, Paris, and Holland would be of much use. The local disturbances are measured by minutes, and where they become relatively great they are of little use for detecting small changes, as in such cases they alter rapidly with the position of the instrument. It is therefore of no use repeating the survey unless the condition of great accuracy is maintained, and I am sure this requires the continued existence of at least Kew, Falmouth, Valencia and Eskdalemuir. We were practically the first country in which a very detailed survey was carried out over so large an area. We were the first to trace the lines of disturbance with an approach to accuracy. The Royal Society spent £1,800 in supplying Thorpe and myself with assistance. We ought to be the first country to decide whether the local disturbances are permanent or variable, and if a hasty decision is now come to to shut up Falmouth and to do away with other observatories, we shall lose the chance of extracting from the previous work all that it might teach us. The only alternative would be to establish for a short time before, during the progress of, and for a short time after the conclusion of the new survey temporary observatories, at which the secular change and diurnal variation could be determined. The cost of this would, I should think, be comparable with that of keeping the existing observatories open for some years, and on the whole I am inclined to advise that a repetition of the survey should now be seriously considered. With the proper staff of assistants it could be carried through in three years at most, and I earnestly hope that a task which will certainly be done in America if it is not done here will not be given up.

As I have told you, I have not been well, and I cannot undertake any work of supervision which would entail any strain upon me, but I should of course be delighted to do what I could.

I am very truly yours,
ARTHUR W. RÜCKER.

The subject was discussed in Section A and also in Section E as it was found that the question of a repetition of the Survey of Sir A. W. Rücker and Sir T. E. Thorpe was of considerable interest in connexion with a new issue of ordnance maps.

The following resolutions were passed by the Sectional Committees A and E and approved by the General Committee.

" 1. That it is desirable that a detailed magnetic survey of the British Isles, " on the lines of that of Professors Rücker and Thorpe for the epoch of 1891, " should now be repeated in order to answer the questions as to the local variations " of the terrestrial magnetic elements within 25 years.

" 2. That a representation to this effect be made to the Royal Society, the " Admiralty, the Ordnance Survey, and the Meteorological Committee.

" 3. That having regard to the importance of the observations at Falmouth in " the work of the previous survey and in other work in connexion with terrestrial " magnetism and meteorology, steps be taken to assist an appeal for a Treasury " grant in order that the observatory at Falmouth may be efficiently maintained."

In pursuance of an understanding made last year when a grant was asked for, no application was made for the reappointment of the Committee nor for a grant from the Association to continue the observations.

Mr. Wilson Fox (M.O. 3638) has now raised the question of the continuance of the Meteorological Office grant of £250 beyond the end of the year 1912, at which date a new observer will be required in consequence of the retirement of Mr. Kitto, for whose appointment the Polytechnic Society have expressed themselves (Minute 335) as unwilling in present circumstances to be responsible.

It was agreed that the Committee will not force the closing of the Observatory by the discontinuance of the grant at the date named if negotiations for the continuance of the Observatory are then still pending.

Glasgow.—Read—M.O. 2888, dated 30th July, 1912, from Professor Becker, explaining that he proposed to apply to the Glasgow Corporation for £150 a year for the meteorological work of the Glasgow Observatory in place of the £75 withdrawn by the Committee, and that the sum would not be sufficient for him to continue to supply customary weekly and monthly schedules as requested by the Office.

365. *International Conference at Paris on Radiotelegraphic Signals from the Eiffel Tower.*—Reported the following correspondence :—

M.O. 2884.

Foreign Office,
July 31st 1912.

SIR,

I AM directed by Secretary Sir E. Grey to inform you that an invitation has been received from the French Government to send official representatives to an international conference at Paris commencing October 15th next to consider the question of improving the Wireless Telegraph Service of time signals and weather reports to ships at sea.

A copy of the Note from the French Embassy, and enclosure, is annexed.

The Lords Commissioners of the Admiralty will be represented at the Conference by the Astronomer Royal and Captain John F. Parry, R.N., Assistant Hydrographer, and I am to enquire whether your department desires to detail an Officer to attend the Conference to deal with questions of weather forecasts and storm warnings, &c. to vessels.

I am, &c.,
A. LAW.

The Director,
Meteorological Department.

(23409.)

Ambassade de France en Angleterre,
Londres,
le 31 Mai, 1912.

MONSIEUR LE SECRÉTAIRE D'ETAT,

CETTE Ambassade par une note en date du 2 juin, 1910 avait signalé au Foreign Office l'émission par la station radiotélégraphique de la Tour Eiffel de signaux caractérisés pour la transmission de l'heure l'égale francaise aux navires en mer. Ce service avait été organisé par le Bureau des Longitudes, qui n'a cessé de le perfectionner afin de le rendre plus utile et plus précis.

Depuis lors les navigateurs signalèrent l'utilité qu'il y aurait, pour eux, de pouvoir, avec des signaux plus exacts controler la "marche" de leurs chronomètres. D'autre part, les observatoires météorologiques et sismographiques ainsi que certains observatoires astronomiques et plusieurs établissements scientifiques demandèrent également des signaux plus précis.

Successivement diverses mesures furent prises en vue de satisfaire à ces voeux.

Tout d'abord, l'Observatoire de Paris augmenta le nombre de ses pendules "garde-temps"; divers perfectionnements furent apportés au dispositif de la pendule expéditrice et l'on mesura très exactement les corrections à apporter aux heures de fermetures du contact de cette dernière pendule, pour tenir compte des retards introduits dans la transmission par l'inertie mécanique et électrique des divers appareils interposés. Enfin une entente s'est établie entre divers observatoires francais et l'observatoire de Paris, pour suppléer ce dernier dans la détermination quotidienne de l'heure, quand l'état du ciel ne permet pas les observations astronomiques.

Un assez grand nombre d'établissements scientifiques d'Europe, ainsi que des Etats-Unis d'Amérique et du Brésil (observations astronomiques, météorologiques, sismographiques, etc.) utilisant déjà les signaux horaires de la Tour Eiffel, le Bureau des Longitudes estime qu'une coopération de ces établissements à l'effet de rechercher les moyens d'accroître encore la précision et l'intérêt de ces signaux serait fort désirable; il serait bon aussi de connaître leur avis sur la meilleure forme à donner aux signaux et sur l'utilité d'y adjoindre quotidiennement certains renseignements météorologiques et scientifiques d'intérêt général.

Dans ces conditions le Gouvernement de la République a pensé qu'il y avait intérêt à réunir, dans une Conférence internationale, les délégués officiels de ces divers établissements. Cette Conférence aurait pour mission d'étudier, au profit des Sciences et des Etablissements intéressés, les améliorations de toutes natures susceptibles d'être apportées au Service d'envoi des signaux radiotélégraphiques par la Tour Eiffel. Elle fixerait, le cas échéant, dans ce but, les bases d'une coopération efficace des divers observatoires et rechercherait les moyens de créer une liaison permanente entre l'organisation horaire francaise actuelle et les organisations similaires déjà créées ou projetées à l'étranger.

Je suis en conséquence chargé de faire savoir à Votre Excellence qu'un Conférence se réunira à Paris le 15 Octobre prochain et que le Gouvernement de la République serait heureux que le Gouvernement Royal voulut bien faire part de la réunion de cette conférence aux observatoires astronomiques et sismographiques ainsi qu'aux bureaux météorologiques, comme à tous les instituts, scientifiques intéressés, et désigner des délégués pour l'établissement d'une entente internationale.

Votre Excellence trouvera, ci-joint, plusieurs exemplaires du programme qui résume succinctement les questions à soumettre à la Conférence Internationale projetée.

Veuillez agréer &c.,
(Signé) A. de Fleuriau.

Programme des questions à soumettre à la Conférence Internationale projetée.

I.

Etudes des améliorations de toute nature susceptibles d'être apportées au service actuel d'envoi des signaux radiotélégraphiques, horaires et autres en vue des besoins

A—de l'astronomie,
B—de la navigation,
C—de la géodésie,
D—de la sismologie,
E—de la météorologie et autres sciences connexes.

II.

Etudes des bases d'une co-opération à établir dans ce but entre les divers observatoires.

III.

Recherche des moyens de créer une liaison permanente entre les organisations actuelles ou projetées en France et à l'étranger.

Reported—that after inquiry by correspondence from members of the Committee, the Foreign Office had been informed on 28th August that the Committee desired the Director to attend the Conference.

366. *Office Staff.—Instruments Division.*—Mr. F. J. W. Whipple has accepted the appointment of Superintendent of the Instruments Division on the terms approved at the Meetings of 1st May and 3rd July, and the conditions recommended by the Gassiot Committee on 25th July. Mr. Whipple commenced work at the Office on Monday, 29th July.

Mr. Rigby.—In consideration of his improved health and valuable services, it was agreed that the date of Mr. Rigby's retirement and pension be postponed until 31st March, 1913, instead of 30th September, 1912, as authorised by Minute 358.

Mr. C. H. Thompson.—Reported—that Mr. C. H. Thompson, who has been absent from duty since 17th July after long absences previously in consequence of nervous breakdown, had been certified by T. Crofts Neville, M.D., by letter of 10th September, 1912, to be permanently unfit to return to his duties. Mr. R. H. Curtis, brother-in-law, had previously reported that Dr. Mott had been consulted and had given him to understand that Mr. Thompson's case was one of mental disease of a permanent and progressive character. After inquiry from Dr. Mott it was ascertained from Miss Alice Thompson, sister, that she wished to try the effect of a visit to Margate before notifying her brother's inability to resume his work, and deferred forwarding the medical certificate until 11th September.

Mr. Thompson was born on 20th May, 1854, and entered this Office in March, 1873. The period of approved service is 23 years to 20th May, 1912. His salary for the last three years has been £200.

It was agreed that the notification of Mr. Thompson's withdrawal from the service of the Office be accepted as from 1st October, 1912, and that an annuity of £76 13*s.* 4*d.* be granted to him from that date, and that the Director be authorised to make any necessary arrangements for his relatives to receive the money on his behalf.

367. *Director's Report and Accounts:—*

Annual Report.—The seventh annual report was presented to the Treasury on 2nd September and published on 21st September.

Instruction in Meteorology for Airmen.—Arrangements are under discussion for a course of instruction in meteorology at the Central Flying School, Upavon, Salisbury Plain. A syllabus of instruction has been drawn up and it is proposed to recommend a meteorologist for appointment as instructor who will also act as observer at the Flying School. In the first instance lectures in accordance with the syllabus will be given by the Director or more experienced office staff, but when he has sufficient experience the instructor will take over the whole responsibility to the Army Council for the observatory work and instruction.

British Association.—The Director was present at the British Association at Dundee and opened a discussion on meteorology in relation to agricultural practice in Section M (Agriculture), which met for the first time as an independent section under the presidency of Mr. Middleton.

International Meteorology.—The meetings of the *International Commissions for Weather Telegraphy* and *for Maritime Meteorology and Storm Warnings* were duly held in London during the week 16th–20th September as indicated in Minute 351. No reply was received to the letter making application to the Government Hospitality Committee in accordance with Minute 357.

The Commissions met in the Committee Room of the Science Museum lent by the Board of Education. Mr. Corless acted as Secretary and reports have been prepared for printing and circulation. A note of the proceedings has been sent to "Nature."

On Thursday the visitors took part in an excursion by motor to Kew Observatory and were entertained to dinner by the Director as President of the International Committee. On Friday they accepted invitations to dinner from the Raj Rana of Jhalawar. On Saturday six of the visitors went to Ditcham Park on the invitation of Mr. Cave for the week end and were entertained at luncheon on Sunday by Miss Bonham Carter at Adhurst St. Mary.

Reports of Work for July, August, and September.—1. *Marine Division.*—Meteorological Tables for the Admiralty :—Mediterranean Pilot, Part I., and Japan Pilot, in course of completion.

69 new meteorological log books, 3 abbreviated meteorological log books, and 6 lighthouse registers ; also 385 North Atlantic registers, 224 radio-telegraphy registers, and 65 Indian Ocean registers ; dealt with on receipt.

Issues of North Atlantic Meteorological Chart for August, September and October, 1912, published. Issue for November in course of preparation. Indian Ocean Chart for August, September and October, 1912, published ; November in press ; and December in course of preparation.

Extraction of observations relative to the Yellow Sea :—17 logs completed.

The estimated cost, at rates ordinarily charged, of work done for public offices, £39 12*s.* 6*d.*

2. *Forecast Division.*—(1) Current work has been kept up to date.

(2) Number of wireless messages has been :—

(*a*) From H.M. Ships, July, 2, August, 2, September, 7.

(*b*) From ships of Mercantile Marine, July, 455, August, 485, September, 500.

(3) Corrections to Daily Weather Report for August prepared.

(4) Forecast Checking up to middle of March.

(5) Wind Frequency tables prepared up to end of May.

(6) Working Charts prepared for binding up to 30th April.

(7) Inquiries :—

	July.	August.	September.
Prepaid Replies	33	42	20
Other Telegraphic Inquiries	24	15	8
Wireless Inquiries	—	—	1
Telephone Inquiries	20	11	2
Personal Inquiries	—	3	3

(8) The issue of Harvest Forecasts terminated on 30th September. Applications for daily forecasts were received from 71 persons, and applications for notification of conditions favourable for a spell of Fine Weather from 72 persons.

(9) Miss A. Penny has resigned her appointment as telegraphic observer at Nairn, in consequence of her marriage. An application has been received from her sister, Miss Janette Penny, to be appointed her successor. The application has been granted.

(10) At the request of the Lords Commissioners of the Admiralty, arrangements have been made for the supply of telegraphic forecasts twice a day to the Commanding Officer of the Naval Aviation School, and also for the supply of manuscript copies of the morning charts. The latter are sent to Eastchurch as "railway letter" by the 10 o'clock boat train to Queenborough.

At the request of the Army Council, arrangements have also been made to send telegraphic forecasts each evening to the Commandant of the Central Flying School, Upavon, Salisbury Plain.

(11) Storm Warning Service.—The new arrangement for the distribution of storm warning telegrams, which has been under discussion with the Post Office since August, 1909, was introduced on 1st October, 1912. The new scheme renders necessary a slight modification of the boundaries of storm warning districts set out in Minute 321 of 1st November, 1911 :—

(*a*) The boundary between districts 4 and 5 on the Irish side should be taken at Fair Head instead of at Loch Foyle.

(*b*) The boundary between districts 13 and 14 should be taken at Spurn Head instead of the Wash.

The distribution of the telegrams is made in accordance with the arrangements described in Post Office letter M.O. 301 of 22nd January, 1912. The delivery offices have been arranged in groups. The groups are described by numbers with the prefix XW, and the telegrams bear no further address, the list of addresses being kept at the delivery offices. In every case the most direct circulation from the Central Telegraph Office to the Office of Delivery is followed. One "A" form only is prepared by the Meteorological Office for a group or set of groups, and is addressed "Meteorological" XW group one (or two, three, &c., as the case may be). The "Admiralty" telegrams are excluded from the classification as it is understood that they will be generally sent to the Admiralty, Whitehall, for transmission over the Admiralty wires. If sent via the Central Telegraph Office, they are written on "A" forms and fully addressed.

With the consent of the Post Office, special "priority" "A" forms have been printed for handing in the telegrams at South Kensington Telegraph Office.

Special arrangements have been made for warnings issued on Sunday evenings, under which messages will be sent only to those offices which are open for telegraphic business on Sunday evenings.

Mr. Lempfert was absent on Inspection Duty from 24th June to 4th July.

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, Parts I. and II., up to date. Part III., section 1, up to date ; Part III., section 2, January and February, 1912, and Introduction, passed for press. Part IV., section 1 ; Copy for January, 1912 : Valencia, sent for press ; Kew, sent for revise ; Eskdalemuir, proof received. Copy for February, 1912, and Introduction for 1911 sent to printers. Section 2, proof received of Tables LXIX.–LXXII. and checked. The summaries for 1911 ready for press.

The examination of the Observatory records, and Sunshine Cards, the tabulation of Cup Anemograms, and the summaries of pressure tube anemograms, have been kept up to date.

Library : 174 Authors' cards and 525 Subject cards prepared for catalogue, 235 volumes of books prepared for binding.

Inquiries as follows :—Newspapers, 52 ; Legal, 26 ; Scientific and Commercial, 129 ; Forecasts, 10 ; General, 7. The receipts in connection with these amounted to £16 5*s.* 1*d.*

Special Weather Notes have been issued to 10 agricultural shows.

4. *Instruments Division.*—The usual Admiralty and Office Work. Two new thermometers were supplied to Eskdalemuir Observatory for the photographic recording instrument, and repairs were carried out to the standard barometer at Valencia Observatory.

Fourteen boxes were sent out for the return of meteorographs found, namely, Ballantrae, Marlborough, Fulner, Dursley, Bath, Antrim, Armoy, Skye, Kilfenora, St. Mary Bourne, Portarlington, Broad Clyst, Norwich, and Lambourn.

Storm cones were renewed at Ilfracombe, St. Andrews, Penzance, Exmouth, and Portsoy, and a fishery barometer was supplied to Porthgwarra in lieu of one removed in 1911.

A medium sized barograph has been lent to Ocean Island in lieu of the large instrument sent there in 1909.

The following were supplied with instruments against repayment :—

J. Dale, Esq., Macclesfield.
Durham Observatory.
W. J. Kilgour, Esq., Fortwilliam.
F. D. Mackenzie, Esq., Folkestone.
R. Thornton, Esq., Morpeth.
Urban District Council, Walton-on-the-Naze.
Dover Corporation.
Ramsgate Corporation.
Clongoweswood College.
O. M. Prouse, Esq., Ilfracombe.
H. Victor Prigg, Esq., Plymouth.
Colwyn Bay District Council.
Elliott Kitchener, Esq., Hemel Hempstead.

Ten requisitions have been received from the Crown Agents for the Colonies, namely, Pahang, British Solomon Islands, Southern Nigeria (2), Gibraltar, Mauritius (2), Sierra Leone, Nyasaland, Bermuda. Also one each from the Union of South Africa and the Commonwealth of Australia.

Four Colonial requisitions are now in hand.

5. *Investigation of the Upper Air.*—Mr. W. H. Dines's report for the quarter ending 30th June, 1912.—The work has been carried on as usual during the quarter except that there has been no kite flying.

The work of preparing and calibrating the instruments for use with balloons, and working up the traces when obtained has been so extended, that it is difficult to find time for other work, and it must be remembered that all the records obtained in the British Isles, with the exception of those

secured by the Manchester University, are dealt with at Pyrton Hill. Baker has also been engaged for some time on two standard self-recording barometers, and has made many meteorographs for sale, a sum of £31 having been received for kite and balloon meteorographs during the past six months.

After consultation with Dr. Shaw, I judged it well to concentrate attention on the work with balloons as being the more important, but it is hoped to continue the kite flying during the coming winter, at least to the extent of keeping the apparatus in working order and the staff well skilled in the work.

I am glad to be able to report that better luck in finding the balloons has been obtained than was the case in the first quarter of the year, but the percentage has been low compared with last year. Also the maximum heights have not been as good as usual; since the method and details of the ascents remain exactly as they were, this must be due to the character of the rubber supplied by Mons. Paturel, and I am writing to him to say that unless an improvement occurs I must obtain the balloons elsewhere. The low average height that has been reached during the last international week, 1st–6th July, is particularly annoying, for eight more expensive balloons were ordered in the hope of reaching greater heights. Within considerable limits as to size the quality of the rubber is of far more importance than the size.

Publications.—Report for July and August from Clerk of Publications :—

—	July.		August.	
	Received.	Issued.	Received.	Issued.
Daily Weather Report ...	770	737	760	739
Weekly Weather Report ...	375	323	375	324
Monthly Weather Report, &c.	575 (May & June)	430 (May) 428 (June)	575 (July)	431
Do. do. (Maps)	25 (May & June)	2 (May & June)	25 (July)	2
Daily Readings	100 (May)	43	100 (June)	48
Geophysical Journal ...	—	—	—	—
Hourly Readings—Meteorological.—Kew	—	11 (December)	—	—
Eskdale	375 (December)	10 (December)	—	—
Valencia ...	—	10 (December)	—	—
Monthly Meteorological Charts (Atlantic).	600 monthly to August (2).	468	600 monthly to September (3)	586
Monthly Meteorological Charts (Indian).	350 (August)	240	350 (September) 350 (October).	355
International Upper Air Observations.	—	—	—	—
Sixth Annual Report ...	—	2	—	3
Cloud Atlas	—	—	—	—
Observer's Handbook (1911)	—	6	—	8
"Forecasting Weather" ...	—	—	—	1
"Structure of the Atmosphere in Clear Weather.	—	—	—	—
Geophysical Memoirs, No. 1	—	367	—	4
No. 2	—	328	—	5
No. 3	—	326	—	4
No. 4	600	332	—	5

Receipts from sales at M.O.—July, £1 4*s.* 6*d.*—August, £1 14*s.* 4*d.*

New publications.—Geophysical Memoirs : Copies of Memoir No. 4 have been received and issued. Barometer Manual : Revise of the letterpress of the seventh edition has been received and the lithography is in hand at M.O. press. Hourly Values—Geophysical Section : Printing is proceeding. Stitched copies of M.O. short reports and memoranda have been received and issued.

M.O. Press.—During the three months ended 30th September, 1912, the issue of the Periodical Publications has been as follows, namely :—

Daily Weather Report.—As contract.
Maps for the Weekly Weather Report.—As contract.
Maps for the Monthly Weather Report.—As contract.
Monthly Meteorological Charts, North Atlantic.—As contract.
" " " Indian Ocean.—As contract.

On 1st July, 1912, there were five requisitions for forms, diagrams, &c., outstanding, including one for 10,000 copies of each of 11 plates for the new edition of the "Barometer Manual for the use of Seamen." Since that date two requisitions have been issued and four discharged, leaving three requisitions still in hand.

The noise occasioned by the working of the new machine, of which complaint had been made, is now much reduced.

Branch Office.—Mr. J. S. Dines's Reports of Work (July and August, 1912).—Some pilot balloon ascents made at Barbados have been worked up.

An experimental glass pen rod has been fitted to the pressure tube anemometer and a slight alteration made in the direction recorder.

I have spent three weeks over the erection of the anemometer at Kew. I was also away a fortnight inspecting and a fortnight on holiday.

Wise assisted at the erection of the anemometer at Kew, was away for a fortnight on holiday, and has devoted the remainder of his time to work for the Meteorological Office.

(September, 1912).—Three observations have been made on tethered balloons with simultaneous quick runs on the anemometer.

I have spent some time experimenting on an arrangement to give a still more open time scale on the anemometer quick run apparatus.

I have carried out some alterations to the wind direction recorder which has been at work at Kew Observatory for the last few months.

Wise has helped with the observational work and devoted the remainder of his time to work for the Meteorological Office.

I have been away for a fortnight on holiday.

M.O. Observatories.—Reports of Work for July, August and September.—Kew.—Meteorology.—The usual work and tabulations. International cloud observations, 12 days. The annual examination and cleaning of the cup anemograph, barograph, thermograph and recording rain-gauge have been carried out. A micro-barograph has been received from Eskdalemuir and set up. A recording mercury barograph was set up by Mr. W. H. Dines's assistants, and is in operation. An anemograph, with standard tower and hut, has been erected by the site of the old cloud camera stand, half a mile from the observatory. A new recording apparatus for the pressure tube at the observatory has been installed and a scale value determination has been made.

Magnetism.—Absolute observations on 13 days. Quick runs in connexion with the Australasian Antarctic expedition on six days. A year's records from the magnetographs of Captain Scott's Antarctic expedition have been received, and a report upon them sent to Dr. Simpson.

Electricity.—Absolute observations of potential gradient on 58 days. Observations with Ebert apparatus on 16 days, with Wilson apparatus on 40 days. The acid in the Mascart insulators of the electrograph tank has been renewed.

Solar radiation.—Absolute observations on 13 days. An intercomparison of the old Ångstrom pyrheliometer belonging to the observatory and a new one lent by the makers has been made by Mr. Dobson.

Seismology.—A Table of seismic data from the Milne seismograph for the first six months of the year has been prepared and sent to Professor Milne.

Supplies.—Photographic paper has been supplied to the India Office, also to Aberdeen and Eskdalemuir.

General.—Pendulums loaned by the South Kensington Museum to the Egyptian Survey Department, and recently swung in Egypt, have been swung at Kew by Mr. Curry, of the Egyptian Service. A comparison has been carried out by Mr. Curry and Mr. Baker of a dip circle belonging to the Egyptian Survey and the Standard Kew dip circle. On 19th September the members of the Commission for Maritime Meteorology, &c., and for Weather Telegraphy visited the Observatory.

Eskdalemuir.—Buildings.—Dry rot having appeared in the magnet house, an inspector from the Office of Works visited the observatory, and workmen are engaged in removing the floor of the west room.

Staff.—Various members have been absent on holiday. Mr. and Mrs. Stonier, the new caretaker and housekeeper, commenced duty on 12th August.

Meteorology.—Normal observations and tabulations. The wet bulb recording thermometer was broken, and a pen recorder started in its place during August.

Magnetism.—The V-magnet showed a rapid drift, and examination revealed the presence of much rust. The magnet was painted with a thin coat of shellac. The July results for vertical force will be omitted.

Electricity.—Normal work. One observation with Ebert's apparatus has been secured.

Seismology.—Unusual seismic activity prevailed about 8th June. The Wiechert seismograph has been out of action for a short time pending the arrival of suitable steel wire for suspension of the driving weight. Fine records of an earthquake on 13th September were obtained. The computed epicentre (near Sea of Marmora) agrees well with the newspaper accounts of damage done. Copies of a number of important records were prepared and forwarded to Prince Galitzin at his request.

Solar radiation.—No observations.

Accounts: Submitted—The following statement:—

	£	*s.*	*d.*
Bank balance on 30th June, 1912	251	6	11
Receipts from 1st July to 30th September, 1912	6,388	15	5
	6,640	2	4
Cheques drawn from 1st July to 30th September, 1912	6,111	9	7
Bank balance on 30th September, 1912	£528	12	9

Submitted—The following Statement of Accounts for the Six Months ending 30th September, 1912:—

Receipts.						Payments.					
1911.				1912.		1911.				1912.	
£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
1,298 16 3	Balance from year 1911–12	—		404 6 4		500 0 0	Director...	—		500 0 0	
8,425 0 0	Parliamentary vote .	—		8,500 0 0							
	M.O. Observatories:						Office Salaries:				
						3,855 10 3	Monthly	3,807 9 2			
684 12 11	Kew ...	377 0 8				323 6 10	Weekly	438 19 2			
614 15 1	Eskdalemuir ...	635 6 5								4,246 8 4	
8 15 0	Valencia	44 17 6					M.O. Observatories:				
—	Farnborough ...	200 0 0				831 0 10	Kew	869 11 6			
				1,257 4 7		653 5 10	Eskdalemuir	764 7 5			
	Departmental Expenses Repaid:					227 18 7	Valencia	280 12 4			
95 13 10	Forecasts, &c. ...	90 13 6				—	Farnborough	149 16 9			
	Marine, Statistics, and Observa-									2,064 8 0	
49 19 5	tories	53 3 10					Office Expenses:				
20 13 8	Instruments ...	30 19 2				341 15 11	Rent, Fuel, &c. ...	350 4 10			
				174 16 6		397 14 6	Furniture, Fittings, &c.	119 18 5			
	Incidental Expenses Repaid:					167 4 1	Incidental	186 4 11			
158 18 5	Forecasts, &c. ...	178 4 11								656 8 2	
26 3 8	Other Branches ...	36 16 7					Postage and Telegrams:				
	Stationery Office										
21 14 0	Account ...	18 18 1				156 3 6	General Postage ...	151 16 3			
				233 19 7		172 16 1	Postage of Daily Weather Reports ...	177 11 7			
	Telegraph Charges Repaid:					1,246 12 1	Telegrams, &c. ...	1,005 13 11			
										1,335 1 9	
171 5 2	Home	124 10 0					Travelling Expenses				
	Telegrams sent						and Inspections...				
342 2 10	abroad	304 0 8				171 19 8		—		239 5 11	
				428 10 8		520 7 6	Superannuation ...	—		674 2 6	
	Instruments:						Cost of Instruments:				
4 10 0	Royal Navy ...	7 10 0									
	Mercantile Marine,					283 9 9	Royal Navy	244 17 0			
706 18 8	Stations, &c. ...	1,213 4 8					Mercantile Marine,				
				1,220 14 8		994 13 11	Stations, &c. ...	1,273 7 4			
										1,518 4 4	
	Observatory										
40 17 3	Forms, &c. ...	—		60 0 9			Auxiliary Observa-				
						1,002 11 10	tories, &c.: ...	—		985 8 5	
—	Inspections ...	—		140 0 0							
	Superannuation						Lectures and Ex-				
	Account:					165 17 4	periments ...	—		175 0 0	
284 13 9	Annuities	357 10 0					Balance:				
	Interest on Invest-					1,356 1 2	Cash at Bank... ...	528 12 9			
45 0 8	ment	26 9 8				37 1 0	„ at Office ...	37 7 4			
17 10 0	Income Tax re-										
	turned	8 15 0									
				392 14 8		20 0 0	Advance for Inspec-				
	Lectures and Ex-						tions	—			
407 10 1	periments ...	—		147 19 9							
										566 0 1	
£13,425 10 8				£12,960 7 6		£13,425 10 8				£12,960 7 6	

Liabilities.				Assets.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
1,797 6 2	To sundry creditors	2,018 15 5		1,393 2 2	By cash at Bank and at Office ...	566 0 1	
39 10 8	„ salaries reserved	6 2 3		330 15 9	„ Admiralty	287 7 0	
134 12 6	„ superannuation	—		237 14 11	„ M.O. instruments in stock	272 2 5	
470 19 3	„ balance	70 15 7		480 15 9	„ sundry debtors	970 3 9	
£2,442 8 7		£2,095 13 3		£2,442 8 7		£2,095 13 3	

Note.—On 30th September the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £2,119 5*s.* 11*d.*

Observatories.—Statement of Accounts for the Six Months ended 30th September, 1912 :—

KEW.

1911.	*Receipts.*	1912.	1911.	*Payments.*		1912.
£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
446 17 11	Gassiot Trust	235 14 2	356 10 10	Superintendent		356 10 10
187 10 0	National Physical Laboratory ...	93 15 0	203 0 6	Assistants		208 2 0
2 10 0	Grazing Rents	2 10 0	40 15 0	Caretaker...		47 6 6
47 15 0	Miscellaneous	45 1 6	8 15 0	Sundays and holidays ...	8 0 0	
146 7 11	To Balance	492 10 10	49 13 9	Overtime	46 2 9	
						54 2 9
			46 15 8	Rent, fuel, and lighting		42 18 6
			1 3 7	Repairs		4 17 8
			—	Insurance...		7 2 9
			26 14 6	Materials		34 14 7
			35 19 5	Instruments		79 19 2
			26 16 0	Books, printing, and stationery		—
			34 16 7	Incidental expenses ...		33 16 9
£831 0 10		£869 11 6	£831 0 10			£869 11 6

ESKDALE.

1911.		1912.	1911.			1912.
£ s. d.		£ s. d.	£ s. d		£ s. d.	£ s. d.
500 0 0	Royal Society (Parliamentary Grant)	500 0 0	200 0 0	Superintendent		200 0 0
			147 8 8	Assistants		250 4 4
—	Salary of Assistant in Seismology to 31st March, 1912 ...	108 6 8	54 12 0	Mechanic and Caretaker		47 12 5
			26 0 0	Handyman		25 17 4
104 9 10	Dr. Schuster...	—	4 9 8	Books, stationery, &c. ...		7 6 0
10 5 3	Miscellaneous	26 19 9	1 3 8	Insurance		5 19 8
38 10 9	To Balance	129 1 0	28 13 5	Travelling expenses ...		14 16 10
				Incidental expenses :—		
			27 15 0	Rental of private wire	28 15 0	
			108 8 7	Instruments and repairs	16 11 0	
			24 1 11	Photographic paper ...	29 15 10	
			14 10 0	Coals and carriage of coals, light	55 4 6	
			—	Repairs, &c.	61 14 4	
			16 2 11	Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	20 10 2	
						212 10 10
£653 5 10		£764 7 5	£653 5 10			£764 7 5

VALENCIA.

1911.		1912.	1911.			1912.
£ s. d.		£ s. d.	£ s. d.			£ s. d.
—	Royal Society (magnetic observations)	36 2 6	137 10 0	Superintendent		137 10 0
			61 15 0	Assistants		60 5 2
8 15 0	Grazing Rent	8 15 0	—	Magnetic observations		36 0 0
219 3 7	To Balance	235 14 10	5 7 0	Rent, rates, and taxes		5 7 8
			—	Private wire		13 5 0
			23 6 7	Miscellaneous expenses		28 4 6
£227 18 7		£280 12 4	£227 18 7			£280 12 4

FORTY-FIFTH MEETING.

South Kensington, S.W., 6th November, 1912.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	MR. MIDDLETON.
THE HYDROGRAPHER.	DR. SCHUSTER.

368. The Minutes (361–367) of the last Meeting (2nd October, 1912) were read and confirmed.

Office Staff.—With reference to Minute 358, authorising the purchase of an annuity of £112 10*s.* a year, it was pointed out that the duration of Mr. Rigby's service from 27th April, 1874, was only 39 years to 27th April, 1913, instead of the 40 years necessary to secure an annuity of thirty-sixtieths of the average salary; but in consideration of his 12 years previous service at Kew, it was agreed to allow the maximum annuity of thirty-sixtieths.

Meetings of Committee.—Dr. Schuster raised the question of the date of meeting, which had hitherto been the first Wednesday in the month.

It was agreed that after the meeting on 4th December, the meetings should be held, as a rule, on the fourth Wednesday of the month.

369. *Correspondence.—Identification of Office Premises.*—Read—M.O. 2,742 from Mr. W. L. Fox pointing out the difficulty of finding the Office premises in consequence of there being no external sign of identification, although public buildings in the neighbourhood were generally so provided.

It was agreed to write to the Office of Works upon the matter.

Sale of Pyrton Hill.—Read—M.O. 3,873, from John Watson & Sons, Estate Agents, Watlington, offering the Pyrton Hill Estate, consisting of a house and 17¾ acres of land for sale for the purpose of an aerological observatory at £2,000, and asking for an offer, with a view to immediate purchase at a smaller price.

It was agreed to reply that the Committee is not in a position to entertain the question of the purchase of the site for an aerological observatory.

370. *Programme of Publications for* 1913–14:—Submitted—the following:—

PROGRAMME OF PUBLICATIONS FOR 1913–14.

Periodical:—Daily Weather Report. 800 to 850.
Meteorological Charts of the Atlantic Ocean. (600 + 150.)
Do. do. Indian Ocean. (350 + 200.)
British Meteorological and Magnetic Year-book, 1913.
Part I.—Weekly Weather Report. (375 + 75.)
Quarterly and Annual Appendices. (375 + 75.)
Quinquennial Appendices (if not completed within current year). (600.)
Part II.—Monthly Report Supplement. Monthly and Annual Summaries. (575 + 100 + 850 for Royal Meteorological Society, and 25 each of two plates.)
Part III (1).—Daily Readings at Stations of the First and Second Order. (250.)
(2) Geophysical Journal. (375.)
Part IV.—Hourly Values from Autographic Records:—
(1) Meteorological Section. (300.)
(2) Geophysical Section. (375.)
Part V.—Climatological Report for the British Empire. (500.)
Observer's Handbook, 1913 Edition. (100.)
Summary of Maritime Weather Signals at present in use in the various countries of the Globe (1913 Edition.) (100.)
Calendar, with Notes and Diary of Operations for the use of observers, for 1914.

Various papers on work completed at the Office or at the Observatories are proposed as Geophysical Memoirs.

Occasional :—Report of the Rome meeting of the International Meteorological Committee. (500.)
Atlas of Tropical Hurricanes. (500 + ?.)
Seasons in the British Isles, with Normals for the four Observatories. (500 + ?.)
Seaman's Handbook of Meteorology. (500.)
Fisherman's Handbook. (500 + 2000.)
Computer's Handbook. (500.)
Tabulator's Handbook. (500.)
Marine Observer's Handbook. (500.)

Programme of Work for 1913.—Submitted—the following :—

PROGRAMME OF WORK FOR 1913.

During the year 1912 so much time and labour have been found to be necessary in connexion with (*a*) The completion of the charts of the polar regions of the Southern Hemisphere for the Royal Society, and the preparation of Meteorological Tables for new editions of the Sailing Directions (Division 1); (*b*) The reorganisation of the supply of information to the press relating to Health Resorts and the consequent revision of the system of inspection; the revision of working charts and the daily charts of the Atlantic Ocean with adjoining continents (Division 2); (*c*) The incorporation into the Office system of the stations of the Royal Meteorological Society, and the necessary work in connexion with the alteration in the units adopted for the results of the work of the Observatories and the Daily Readings at Stations of the First and Second orders (Division 3); (*d*) The supply of instruments to the Colonies (Division 4) and the preparation for publication of the Hourly Values of the Meteorological and Magnetic records of the Observatories (Year book Part IV. 2); (*e*) The details of work and organisation of the Observatories and (*f*) the international organisations especially with regard to meteorology in relation to agriculture, weather telegraphy, and maritime meteorology—that the staffs of the Office and the Observatories have been kept continually and fully occupied with the work for regular publications; and, even so, the Geophysical Journal has been allowed to fall a good deal in arrear (the January and February numbers for 1912 were only issued in October) and the volume of Hourly Values for the Observatories for 1911 has not yet been issued. Consequently very little has been done for that part of the programme for 1912 which dealt with *Occasional Publications, Discussions and other Researches.* It has therefore to be repeated for the year 1913.

The work of Division 1 (Marine Meteorology) has been seriously hampered by illness of members of the staff, and that of Division 4 by the long vacancy of the appointment of a Superintendent.

The first issue of the publications of the Hourly Values for the Observatories appears without a general survey of the results which have been obtained, as it has not been possible hitherto to assign the duty of drawing up such a survey. It is important that it should bring into comparison the results of the work of all the Observatories, and that cannot properly be done until the publication is in its final form. The correspondence with the Observatories respecting details of the form of publication has run to lengths which is somewhat out of proportion to the issues involved. In the first instance that may be regarded as inevitable, when it is a question of co-ordinating the results of different Observatories with different views. But the principle of co-ordinating the results from the several Observatories as a joint contribution to the sciences represented is so important that the time and labour spent upon it must be regarded as justified. For 1912 and future years, it is intended to arrange for a survey of the results to be prepared as soon as the values are printed off.

The questions of organisation that will come up for settlement or execution during the year 1913 are :—

(*a*) A revision of the arrangements with the Scottish Meteorological Society as to the Climatological work for Scotland.

(*b*) The revision of the work of the Kew Observatory in consequence of the transfer of the testing work of the National Physical Laboratory to Teddington, which has been unfortunately delayed owing to Dr. Glazebrook's illness and to strikes.

(*c*) The revision of the arrangement at Eskdalemuir in view of the Report adopted by the Gassiot Committee, the lapse of the Royal Society grant for seismology, and the difficult questions arising in connection with the magnet house in consequence of the appearance of dry rot in the woodwork.

To these must be added the following items which concern this Office :—

(*d*) Further provision for work on the meteorology of the Colonies and Dependencies which has long been under consideration.

(*e*) The organisation of the Library, and

(*f*) Further organisation of the Museum and the provision of additional show-cases for the display of publications on sale, &c., referred to in last year's programme.

The following new items should be mentioned.

1. **Marine Meteorology: Surveying Vessel between Labrador and Greenland.**—As a sequel to the loss of the "Titanic" on the 15th April, 1912, a suggestion has been made by an Advisory Committee to the Board of Trade in favour of maintaining a vessel on service between Labrador and Greenland during the early months of the year to obtain information which will throw light upon the irregularities of the occurrence of ice in the North Atlantic. The question is under consideration. It is probable that if the scheme is adopted there will be opportunity for special meteorological work including the investigation of the upper air over the sea. The British Association has made a grant of £50 for

expenses in connexion with that investigation if the opportunity is afforded. The investigation of the upper air over the sea is a question in which at present this country has taken no part—all the work has hitherto been done by the German or Italian, Russian or Danish Navies, or by private owners of vessels as M. Teisserenc de Bort (with the late Professor Rotch), and the Prince of Monaco (with Professor Hergesell.)

2. **The Branch Office at South Farnborough.**—The buildings for this are now going up. Mr. J. S. Dines is making a preliminary trial with Mr. Dobson of the regular investigation by pilot balloons and the preparation of a daily map based on telegraphic information from the Office, with a view to special forecasts for airmen.

Mr. Dines's work has hitherto been paid for by the National Physical Laboratory out of the grant for the Advisory Committee for Aeronautics. £400 is assigned for the current year. As soon as the work begins regularly the grant ought to come over to the Meteorological Office vote, and the attention of the Advisory Committee ought to be devoted to special experimental observations obtained on airships and aeroplanes. A Memorandum on the subject has been prepared for the Advisory Committee.

3. **Meteorological Instruction at the Central Flying School of the Royal Flying Corps at Upavon.**—It is proposed that a Meteorologist should be on the staff of the Central Flying School for the purpose of giving instruction in Meteorology, and experimental work is also contemplated. It is suggested that until the Meteorologist to be appointed has acquired the necessary experience lectures should be given by members of the Office staff.

4. **International Meteorology.**—The employment of a Graduate Assistant with special reference to meteorological observations in British Colonies has kept that section of the work from falling further into arrear, but the summary has not been issued as was intended owing to pressure of work in the Statistical Division ; also, no progress has been made in the past year with the three proposals mentioned in the programme of last year, viz. : (*a*) the publication in connexion with the Solar Commission of monthly values for the Globe from a series of stations at the rate of two to a ten-degree square, (*b*) the publication of monthly values for centres of action on the suggestion of Professor Hildebrandsson, and (*c*) the immediate exchange of reports obtained by telegraph from a selected number of stations for a " réseau mondial " of which 20 are British. For the first of these proposals the division of work between the Office and the Solar Physics Observatory, which is the headquarters of the Solar Commission, has never been strictly defined, and during the year the Solar Commission has held no meetings. The arrangements for the future need consideration in view of the tranfer of the Solar Physics Observatory to Cambridge.

It is most important that these proposals should not be allowed to lapse. Every year adds its evidence to prove that the Meteorology of the Globe should be studied as a whole. The fine summer of last year, the abnormal features of the distribution of ice in the Atlantic, and the cold summer of this year, are left without any real chance of explanation until a view of meteorological conditions over the whole Globe can be given.

In other respects the demands of International Meteorology are considerable. A meeting of the International Meteorological Committee is proposed for Rome commencing on 7th April, 1913. The Committee will have under consideration the following important questions :—

(*a*) The organisation of a scheme for developing the application of Meteorology in relation to Agriculture through the International Agricultural Institute of Rome.
(*b*) The change of units for the publication of the results of the upper air (Commission for Scientific Aeronautics).
(*c*) Changes in the International Code for Weather Telegraphy.
(*d*) The question of regular daily observations with pilot balloons has been brought forward by the Commission for Scientific Aeronautics through the Foreign Office, and in connexion therewith the organisation of cloud observations and of pilot balloon observations.
(*e*) The revision of the scheme of signals for Storm Warnings, including night signals, which will involve the re-organisation of our own system of Storm Warning Signals.
(*f*) The collection of data on an international basis from certain ocean squares as a contribution to the Meteorology of the Globe.

These questions will come before the Committee as recommendations from Commissions which have already met.

The Commissions which have not yet met to consider questions to be reported to the Committee are the Solar Commission, already mentioned, and the Magnetic Commission.

(5) **Periodical Publications.**—The only change contemplated in the present periodical publications is the alteration of the charts of the Weekly Weather Report to include the representation of pressure, &c. over the Russian Empire and the American Continent as well as the Atlantic, in accordance with the specimen published in the Seventh Annual Report.

The issue of the first of a series of annual Climatological Tables for the British Empire, and of the monthly values for the Globe, will be arranged if possible.

(6) **Occasional Publications, Discussions, and other Researches :—**

MARINE DIVISION.

xli. *Monthly Meteorological Charts of the South Atlantic Ocean* (Minute 360).—The preparation of these Charts is proceeding and they will be issued month by month as they are ready.

ii. *Synopsis of Tropical Revolving Storms, with accompanying Charts.*

xxxv. *Meteorology of the China Sea and North Pacific Ocean.*—The meteorological data are being taken out in continuation of the data for currents which have been taken out for the Hydrographic Office.

iii. *Meteorology of the South Pacific Ocean.*—No opportunity has yet been found for arranging co-operation with the Australian Commonwealth Bureau in this matter and no time has been available for extracting the data.

xlii. *Continuation of the Investigation of the effect of the Labrador Current on the surface temperature of the North Atlantic, and of the latter upon the air-temperature and pressure over the British Isles.*—This will be a personal contribution to "Geophysical Memoirs" by the Marine Superintendent.

xliii. *The Marine Observer's Handbook—new edition of the Instructions for keeping the Meteorological Log.*—A new edition of the "Instructions" is required and it is thought desirable to have a book in octavo instead of folio that will serve the purpose of a general handbook.

Forecast Division.

The new working charts for the Forecast Division have outline maps of the British Isles on the backs upon which the observations of maximum and minimum temperature, rainfall, and sunshine for each day are being entered as well as the weather for the three sections of the day. These charts will enable a new method of checking forecasts, which has long been contemplated, to be introduced.

O.2.—The preparation of a new edition of Instructions for Telegraphic Observers has been delayed until after the meeting of the Commission on Weather Telegraphy. It is now in hand.

xxxvii. *Monograph on Coast and Sea Fog.*—Beyond setting out the observations of sea fog for a few selected months on daily weather reports little progress has been made with this, but the need for guidance in framing forecasts of sea fog makes itself felt more and more. A suggestion has been put forward by Lloyds that daily forecasts should be telegraphed to selected signal stations for communication to passing coasting vessels. The probability of the occurrence of fog should form an important item in such forecasts.

xxxviii. *Monograph on snow in the British Isles.*

xxxix. *Wind Tables for the British Isles.*

viii. *Forecast District Inquiry.*—The daily plotting of the data on the back of the working charts referred to above may be regarded as connected with this work.

Statistics Division.

Occasional Publications and Discussions.

x. The Seasons in the British Isles since 1878. This is in the same position as it was a year ago. It ought to be possible to complete it and publish it during the coming year.

xi. The Observer's Handbook, 1913 edition.

xii. The Sequence of Weather Changes at the Winter Quarters of the "Discovery."

xiv. Climate and Health. British Association Committee.

xv. Summaries of Hourly Readings at four Observatories. It is intended to combine this with the publication and discussion of the district values of rainfall, temperature and sunshine for the four quarters and for the whole year for each year from 1878 to 1910 (sunshine 1881-1910).

The following additional items will be kept in view :—

CD. C.O. 6.—Discussion and preparation for publication of the observations of Atmospheric Obscurity at Kew since 1893.

xxvi. Preparation of new Humidity Tables.

xliii. *Climatological Tables for selected stations in the British Isles.*—Preparation for publication in one volume of the means for each month of the period 1871–1910 for a selection of stations, of pressure, temperature, rainfall, and sunshine, at present in manuscript.

xliv. *Sequence of Weather at the Observatories of the Meteorological Office.*—Publication of the daily values of the meteorological elements at Kew, Valencia, and Aberdeen for the period 1871–1910. The values of maximum and minimum temperature, velocity of the wind, rainfall, and sunshine might be conveniently collected in one table, while pressure and mean temperature had each a separate table. The volume for each observatory ought to be planned in such a way as to make it a pattern for the manuscript tables of the local meteorological statistics which each large centre might be expected to keep in its public library. (250 pp. quarto for the three observatories.)

Instruments Division.

The principal part of the work of this Division is the supply of instruments to H.M. Navy, the Dominions, and Crown Colonies as well as to observers in the United Kingdom, and to the ships which furnish information to the Marine Division.

The change to C.G.S. units is necessitating a close examination of the specification of the various instruments in general use.

A Dial Barometer has been made and patented by the Cambridge Scientific Instrument Company (*see* Minute 295) to read directly in millibars. The necessity of distinguishing between the primary reading of the instrument and the reduced value in millibars is, however, giving rise to some difficulty. The term "baromil" has been suggested for the unreduced reading.

The workshop is being fitted with a lathe and other tools driven electrically : these should be ready for use by the end of 1912.

The examination of the air of London has not been started yet. This will be placed first in the programme of new work for next year.

xl. The pen-mercury-barograph or *float-barograph* mentioned in the last programme is now set up at Kew and giving consistent results.

xviii. *Microbarograph traces.*—With the co-operation of Mr. G. I. Taylor, Schuster Reader, it is proposed to make systematic comparisons of traces at three or four stations about five miles apart. As a preliminary pressure guages are being fitted to make more precise tests of sensibility possible.

Callendar Radiation Recorder.—The total heating effect recorded by this instrument each day is now tabulated systematicaliy. A detailed discussion of the records for 1912 is in hand.

Pressure-Tube Anemographs.—The instrument for Spurn Head has gone through a prolonged test at Kew. As soon as funds permit more instruments of this type will be erected.

Raingauges.—Two new types of raingauge have been sent to the Office for testing. A comparison of these with other recording raingauges will be undertaken.

Frames.—Frames for the exhibition of the Daily Weather Reports, Storm Warnings, and Fishery Barometer Diagrams are ready for issue from the Office. It is hoped that a large number of them will be brought into use in the course of 1913. The issue of a new chart for the Fishery Barometers is designed to increase the interest taken in these instruments by the Communities to which they are lent.

Cloud Observations.—In compliance with a request from The Hague the observation of the velocity of the clouds at 13 o'clock will be included in 1913 in the work of the corps of observers.

Electrical Wind Direction Recorder.—An instrument for recording the direction of the wind at a distance is under discussion and should be constructed during the year.

The other items on the programme for last year with which little or no progress has been made are as follows :—xvii. Anemometric Comparisons. xxxii. Redetermination of Anemometric Constants. xxi. Barograph with 10-fold magnification. xxii. Rate of Rainfall Recorders. For xxix. Notes on Instruments, Dr. Chree has supplied a paper on the Marine Barometer and Mr. Dobson on the Wilson Electrometer for publication in Geophysical Memoirs or elsewhere.

METEOROLOGICAL OFFICE OBSERVATORIES.

Programme of Work, and Estimates for 1913-4.

(Laid before the Gassiot Committee, 27th November, 1912.)

Periodical Publications.

The ordinary programme of work at the Observatories is now almost completely represented by the following sections of the Year Book, viz. :—

Part III (1). Daily Readings at Meteorological Stations of the First and Second Order.
Part III (2). Geophysical Journal.
Part IV (1). Hourly Values from Autographic Records (Meteorological Section).
Part IV (2). Hourly Values from Autographic Records (Geophysical Section).

What is needed in order to complete the presentation of the results which are incorporated in these sections of the Year Book is a short but comprehensive survey of the whole series, which should take into account the relation of the different elements one to another, and a comparison of the values from the different observatories with their normals and with each other. This is a work which involves a good deal of responsibility as well as judgment and experience, but it ought not to be neglected on that account. A survey of this kind would form a valuable contribution to the literature of the subjects. It is obvious that no outsider will attempt it and an attempt of some kind, better or worse, ought to be made from within. It need not be included in the books of data but might form a separate number of the "Geophysical Memoirs." During the past year so much effort has necessarily been expended in arranging the details of the form of publication and, so far as Meteorology is concerned, in converting values to new units, that the results can barely be ready for the Autumn meeting of the Gassiot Committee. It is hoped that in future years the printing may be completed in time to allow of an attempt being made to give a survey while the events of the year are still fresh in the memory, and that one of the senior members of the combined staff may be set free from the regular duties to undertake the work.

2. The results for the Upper Air obtained by means of kites, pilot balloons, and sounding balloons have been included in the issues of the Weekly Weather Report for 1911, but for 1912 a new form of tabulation has been introduced and the results are being issued monthly as an addition to the "Geophysical Journal." A request for co-operation on an international basis in daily observations with pilot balloons has been communicated through the Foreign Office by the German Ambassador on the invitation of the International Commission for Scientific Aeronautics. The request can hardly be denied as the closer investigation of the distribution of air currents seems to be the next step in advance in the problem of determining the causes of pressure changes, to which so notable a contribution has been made in this country in the past year. The stations in the British Isles which are appropriate for this purpose are Aberdeen, possibly Eskdalemuir, Valencia, Falmouth (if the proposed reorganisation of the Observatory is carried out), and one of the stations near London, probably Farnborough. This new enterprise will, however, imply additional expense, for which at present funds are not available. It is associated with an urgent request from Holland for co-operation in cloud observations, which is also an important item for this country.

3. The other regular work which is not fully represented in the Periodical Publications of the Office already mentioned is that which is done for the Daily Weather Service at Kew, and the seismological work at Kew and Eskdalemuir. The former is dealt with in the Daily Weather Report. Seismological results are supplied to Professor Milne for the Committee of the British Association, but no adequate means are yet provided for the publication of the more elaborate seismological work at Eskdalemuir.

Discussions and other Researches.—4. As regards this section of the work it is not practicable at present to lay down any definite programme.

The organisation of the work at Kew Observatory must necessarily be changed when the staff of the National Physical Laboratory is removed. The removal has been delayed for some six months beyond the time originally contemplated, by unforeseen circumstances. The reorganisation depends upon the provision which the Treasury may be willing to make.

5. The work at Eskdalemuir is also necessarily dependent upon the procedure following the report adopted at the July meeting of the Gassiot Committee.

6. In both case the courses which are open depend upon the funds available. So far as Kew is concerned the Appropriation in Aid from the National Physical Laboratory at the rate of £375 per annum, which includes a contribution of £200 towards the Superintendent's salary, will cease. The staff of assistants taken over from the Laboratory does not include any expert in the manipulation of instruments, nor anyone who can, at the present time, adequately replace Mr. Baker and Mr. Constable who, among other duties, discharged the "statutory" duty of inspecting the self-recording instruments at the Observatories of the Meteorological Office.

7. So far as Eskdalemuir is concerned the grant of £450 from the Royal Society for seismology will be exhausted on 15th September, 1913. The Observatory has now been in operation for nearly five years, and it is time to consider whether the arrangements, financial and otherwise, made five years ago are adequate for their purpose. The difficult question which arises as to the cause of the dry-rot which has appeared in the Magnet House has been referred to the Magnetic Sub-Committee. The Superintendent reports that the work of recording must necessarily be suspended for some time, and any provision for the future will depend upon the success of the measures adopted to prevent future interference with the continuity of the records.

8. In the cases both of Kew and Eskdalemuir, therefore, if the work is to progress it is necessary to make provision for larger expenditure.

9. For the year 1912–13 the Parliamentary Grant for Meteorology falls short of the estimated expenditure by £953. Even if certain exceptional items are withdrawn or reduced the excess will completely exhaust the balance in hand, and there are many items of additional expenditure at the Office besides those already mentioned, which must be provided for unless the work of some one or more of the divisions or observatories be discontinued.

10. The Grant for Eskdalemuir has hitherto been made to the Royal Society, but as the Grant to the Meteorological Committee has had to bear the deficit on the accounts of the Observatory and the Lords of the Treasury have been informed that the Committee see no prospect of meeting the deficit in any other way, it is proper that the acceptance of the responsibility should be definitely recognised by the transfer of the Eskdalemuir Grant to the Meteorological Committee.

11. A question of general policy arises with regard to the future of Eskdalemuir in relation to Meteorology. The tenure of the premises at Pyrton Hill near Watlington, where Mr. Dines has carried on the work in connexion with the investigation of the upper air for the Meteorological Office with conspicuous success, is precarious, and the Meteorological Committee may at any time find itself face to face with the problem of providing a central aerological station for this country. The part of the work for which it is most difficult to provide is the kite work, and for this the position of Eskdalemuir is eminently suitable. That work, as the investigation proceeds, becomes more and more related to the Daily Weather Service, and in any new arrangement a telegraphic station would certainly be associated with the central aerological station. The question of the necessity for more telegraphic reporting stations in Scotland has been raised in the House of Commons and must be attended to. The Gassiot Committee has already recommended that the equipment of Eskdalemuir as a first order meteorological station should be completed, but no action has been taken upon the recommendation because there were other claims on the time of the Observatory staff. The Meteorological Committee lays no particular stress upon the necessity for a first order meteorological station in the south of Scotland, and it is evident that to have a first order station in one place, a kite station in another, and a telegraphic reporting station in a third in the same neighbourhood would be quite inadmissible. The natural policy seems to be to extend the work at Eskdalemuir (with a proper addition to the staff), and to provide for kite work and telegraphic reporting there.

12. The Meteorological Committee have also taken into consideration the difficulty in which they are at present placed whenever they are called upon to make an appointment requiring scientific training in Meteorology, Terrestrial Magnetism, or Seismology. They feel that it is imperatively necessary in the interests of the subjects for which they are responsible to form a scientific staff which has the necessary practical training which must in practice be obtained at one of the Office establishments.

13. Having these general views in mind the Meteorological Committee have considered the question of the existing deficit estimated at £953 per annum, and the other items in which increased expenditure is unavoidable if the work of the Office and Observatories is to be carried on, and they have instructed the Director to prepare for their consideration a letter to the Treasury setting forth the requirements for additional funds, amounting altogether to £3,569. The items will be taken into further consideration at the next meeting of the Committee on 4th December.

The items include the following :—

	£	£
For Kew Observatory :		
To meet the loss of the Appropriation in Aid from the National Physical Laboratory	350	
Mechanic	120	
Assistant (Meteorologist), and provision for some increase of salaries	150	
	620	
Capital sum for re-equipment after alterations	250	
		870
For Eskdale Observatory :		
To meet the current deficit	126	
Seismologist (replacing the Royal Society Grant) £200-£25-£325	250	
Improvement of salary of Superintendent and Assistants	100	
New Assistant (Meteorologist) for Upper Air and Telegraphic work (transferring some clerical work to London)	125	
		601
For Valencia Observatory :		
Assistant (Meteorologist), for Pilot Balloon work and Cloud Observations	150	
Capital sum for repair of Tower	75	
		225
		£1,696

Mr. Walker in reply to a letter of inquiry has suggested a different scheme of organisation for the Observatory at Eskdalemuir.

Pending a decision upon the financial questions raised, the estimates which are circulated with this statement of the programme for 1913–14, must be regarded as provisional. The salaries entered in the draft Estimates do not take account of any increases that would depend upon additional funds being raised.

MINUTE of the GASSIOT COMMITTEE with REFERENCE to the FOREGOING PROGRAMME and ESTIMATES.

A programme of work at the Observatories, together with an estimate of expenditure, was submitted by the Director of the Meteorological Office. With reference to paragraph 10 of the programme the question of the financial responsibility for Eskdalemuir Observatory was discussed, and it was referred to the Treasurer of the Royal Society to examine the question and report to this Committee. Subject to this reference the programme of work, as submitted, was approved. No remark was made upon the estimates.

The consideration of the details as to the programme for the year must be taken up as soon as the reconstruction of the building at Kew is completed, and the lines of re-organisation of the work at Eskdalemuir are laid down.

PYRTON HILL. UPPER AIR RESEARCH.

For the present the arrangement whereby Mr. W. H. Dines undertakes the work at an inclusive cost of £450 a year is continuing, stress being laid almost exclusively on observations with sounding balloons and the discussion of the results. The owners of the premises, are, however, trying to sell the property and if they should succeed the present conditions will terminate in September, 1913.

371. *Estimates for* 1913–14.—Read—M.O. 3,716 from Sir R. Chalmers, asking for the usual estimate of the expenses of the Office for the year 1913–14, in order that Parliament may be asked to make the necessary provision in the vote for Scientific Investigation, &c.

Read also—the following letter (M.O. 3,316) from the War Office :—

M.O. 3,316.

War Office,
London, S.W.,
4th September, 1912.

SIR,

I AM commanded by the Army Council to transmit for your consideration the enclosed copy of a Resolution passed by the International Commission for Scientific Aviation at the 7th Meeting in Vienna, which has been forwarded to the Foreign Office by the German Chargé d'Affaires, with an expression of the Commission's desire that the wishes formulated therein should be carried into effect as soon as possible.

As the Army Council are of opinion that the matter contained in this Resolution is a question affecting rather the Meteorological Office than this Department, they would be glad if you would take such steps with regard thereto as you may consider desirable.

I am to add that the Army Council would be glad to co-operate with you, as far as they find it possible, in any action you may think fit to take.

I am, &c.,
R. H. BRADE.

The Director,
Meteorological Office.

RESOLUTIONS of the INTERNATIONAL COMMISSION for SCIENTIFIC AVIATION at their 7th MEETING in VIENNA, 28th MAY–1st JUNE, 1912.

For all States.—Belgium, Bulgaria, Denmark, Germany, England, France, Italy, Netherlands, Norway, Austria, Russia, Sweden, Switzerland, Spain, Hungary.

The Commission express the desire that in all European States there should be established a systematic network of pilot balloon stations which would observe daily between 11 a.m. and 1 p.m. by means of a theodolite a pilot balloon of known velocity of rising. This network of stations should not be too close at present. The Commission are of opinion that the establishment of such a network would be of the greatest scientific and practical value.

The Director presented a memorandum setting out the expected deficit in 1913–14, on the basis of the estimates for 1912–13, as £899, instead of £603 as estimated for 1912–13, and also the following items affecting the consideration of the estimates for 1913–14 :—

1. Grants under other heads which should now be included in the Meteorological Office grant, viz., Branch Office at South Farnborough £400, and Eskdale Observatory £1,000.
2. New charges in connexion with Kew and Eskdale Observatories indicated in the letter to the Treasury of 11th December, 1911 (Minute 329), amounting to £700.
3. New charges at the Office, including revision of secretarial arrangements and of salaries of the superintendents whose period of appointment terminates in 1913 (Minute 258), provision for colonial observations, additional telegraphic services for improving the forecast service (Minute 313), equipment

for the proposed international system of storm signals and for night signals, and proper provision for superannuation amounting in all to £1,350.

4. New charges at the observatories providing for an assistant to undertake meteorological work and telegraphic reports at Eskdalemuir and to supplement the staff at Kew and Valencia and thus form a class of assistants with scientific or technical training necessary for the work of the Office and Observatories; providing also for pilot balloon observations in accordance with the request of the International Commission for Scientific Aeronautics: these new charges amount to £620 for the observatories in addition to the £700 already mentioned.

The sum total of these requirements would involve an increase of the grant by £4,969, of which, however, £1,400 is already provided in other votes.

After discussion the Director was requested to draft a letter to H.M. Treasury setting out the requirements and distinguishing, if possible, the more urgent of them.

372. *Meteorological Office Observatories* (Minute 363).—*Eskdalemuir* (i).—It was agreed to adopt the recommendations of the Gassiot Committee as set out in the Minutes of their meeting of 25th July, and the Director was instructed to give notice to the Superintendent that the tenure of his present appointment would be terminated on 15th May, 1913. He was also requested to prepare a statement of duties of the Office of Superintendent for the use of the Gassiot Committee in making their recommendation for the next period.

(ii) *Seismological Assistant* (Minute 363).—Reported—that the President of the Royal Society had given provisional assent (M.O. 3,714) to the appointment of Mr. L. H. G. Dines and that Mr. Dines had taken up his duty at the Observatory on Saturday, 2nd November.

(iii) *Structural alterations in Magnet House.*—Read—M.O. 3,892 (C 48) from H.M. Office of Works, Edinburgh:—

H.M. Office of Works,
Parliament Square, Edinburgh,
19th October, 1912.

DEAR DR. SHAW,

Eskdalemuir Observatory.

PRETTY thorough examination of the condition of the asphalte has now been made, and it appears that the vertical asphalte shows signs of having crept, probably through the work having been done in such wet weather, and also to there being insufficient adhesion to the impervious surface of the whinstone walling. The asphalte is found in some cases to be of much greater thickness at the lower level, and much thinner than it ought to be at the higher level, some parts also having left the wall through imperfect adhesion. Water may have come in from the top through the turf covering being too spongy, thus not properly draining off the water.

Inside the wood floor is becoming decayed although there is no sign of water coming up through the floor. Mr. Ryle, Assistant Architect of this Office, has thoroughly investigated the matter with Mr. Walker and he recommends:—

(1) That immediately the whole of the external asphalte flashings be renewed, before the winter sets in.

(2) That a channel be cut round the whole of the corridor next outer walls. It is thought that the cutting of this channel would only take four or five days, and it would afford means of ascertaining where there are any leakages through the walls.

It is also recommended that the following work be undertaken next year:—

(1) That the floor of the East Room and also of the corridor be lifted, the asphalte being left exposed for some time so that it may be observed whether there is any leakage in the floor. I do not think it is necessary in any case to cover up the asphalte, which forms a satisfactory floor covering.

(2) That the existing disused ducts in the floor be removed and the bottom of the shafts be filled in.

(3) That the two disused ventilating shafts on the North wall be removed and asphalted over.

(4) That the existing turf covering be removed and replaced with a covering of granolithic, channels being formed round the base and connected to drains.

(5) That a drain be taken from the "corners" at each side of the lobby.

Mr. Walker is not satisfied with the experimental piers resting on the asphalte. He desires that they should be placed on slate slabs resting on the concrete.

Before doing anything further, I shall be very much obliged if you will let me have your observations.

I am, &c.,
W. T. OLDRIEVE.

W. N. Shaw, Esq., LL.D.,
Director,
Meteorological Office.

Also—a letter (M.O. 4,033) from Mr. Walker, Superintendent, expressing doubt as to whether the present magnet house could be made to be satisfactory.

Also—M.O. 4,055 from Dr. Chree.

It was agreed to authorise the work proposed to be executed before the winter sets in, and to ask for the opinion of the Sub-Committee on Terrestrial Magnetism before coming to a conclusion as to the further course to be adopted.

Kew Observatory.—Structural alterations (Minute 356).—Read—M.O. 3,893 from Dr. Glazebrook :—

The National Physical Laboratory,
Teddington, Middlesex,
21st October, 1912.

DEAR DR. SHAW,

THE Executive Committee of the Laboratory, at their meeting on the 18th instant, had under consideration the progress of the new buildings and the question of transferring the work from Kew on the dates mentioned in my letter of 25th June, 1912.

The Committee greatly regret to learn that since that date the progress has been very slow. As you are aware, in the early part of the year the coal strike prevented the delivery of steel work and delayed the start. The Contractor hoped in June that by putting on extra men and working overtime he could make up this loss, but the dock strike stopped the delivery of cement; he could only get it in small quantities and then at a greatly increased price, and it was not until late in August that the full supply was obtainable. During my absence the Architect was urged by letter to press forward with the work, and on my return I wrote strongly pressing the urgency of the case. He replied 2nd October, 1912, "I have seen Dorey to-day and he admits the impossibility of getting the building completed by the 1st January. He thinks it will take from two to three months longer."

He goes on to explain the steps he is taking to comply with a suggestion of mine that the work in certain rooms in the Optics block should be pushed forward so that they may be used as early as possible. After hearing the position the Committee reluctantly came to the conclusion that it will not be possible for them to admit the workmen within the building at Kew so early as 1st January, 1913. You will remember that the letter of 25th June fixed this as the earliest date for the commencement of the internal alterations. Nor is it possible to fix definitely a date by which these alterations can certainly be commenced. The Committee will use every endeavour to remove the optical work to Teddington at as early a date by as possible and will let you know when this date can be fixed. The optical work is carried out in the sextant room and the first floor. They regret that they cannot say more.

I was instructed to ask you to communicate the contents of this letter to the Office of Works, and to suggest to you that it would be well to arrange for the definite postponement of the internal work.

The room occupied by Mr. Foster will be set free in the course of ten days or a fortnight, and much of the apparatus used for the watch and chronometer tests is now being removed. Tests are at the moment in progress on a batch of watches which will, I understand, last a few days into November, and we are having some difficulty in getting the time signal here, but apart from this everything is clear for the removal of the caretaker's quarters.

I understand informally that there is not likely to be any difficulty in carrying forward the vote, while I know you fully realise the importance of not interrupting the optical work for the Laboratory.

Yours very truly,
R. T. GLAZEBROOK.

Dr. W. N. Shaw, F.R.S.,
Director,
Meteorological Office.

It was agreed that the Office of Works be notified that the National Physical Laboratory will not be able to set the buildings free for alteration by 1st January as arranged, and be asked to postpone the structural alterations: meanwhile to make arrangements if possible for the accommodation of the caretaker on the first floor in one of the rooms vacated by the National Physical Laboratory by the transfer of the watch and barometer testing, which is in progress.

Publications.—Reported—the receipt of the final proofs of Year Book, Part IV. (2), *Hourly Values from Autographic Records—Geophysical Section*, completing the presentation of results of the observatories for 1911.

373. *Auxiliary Observatories* (Minute 345).—*Glasgow.*—Read—the following letters (M.O. 2,888, 3,692) :—

The Observatory, Glasgow,
30th July, 1912.

DEAR DR. SHAW,

I WAS absent from home in June and July and unable to reply to your letter of 5th June.

I am pleased to hear that the Meteorological Committee has no objection to the instruments being retained here until 1918 for the continuation of the records in the same form as at present.

There is little prospect of the City of Glasgow raising their grant to more than £150. An annual grant of £150 would enable me to continue the observations and reductions and to bring up to date the tables which I propose to publish in our Glasgow Meteorological Statistics, provided that the computer can work uninterruptedly at the same kind of reductions; but I should not have sufficient assistance to get the monthly summary of a second order station compiled nor to get the hourly values regularly copied for publication by your office.

Though I cannot undertake to furnish your office with monthly or weekly reports on *fixed* dates, I shall be pleased to give you at intervals suitable to us copies of the hourly readings obtained with your instruments.

Believe me,
Yours truly,
L. BECKER.

The Observatory, Glasgow.
5th October, 1912.

Discontinuance of Meteorological Station at Glasgow.

DEAR SIR,

I HAVE now decided not to ask the local authorities for funds for the continuation of the meteorological observations in their present compass from 1913 to 1918, but to break off the photographic recording of temperature and height of barometer, not in 1918, but next year when your office withdraws its support. The instruments will, therefore, be at your disposal on 1st April, 1913.

I shall continue all other observations on behalf of the University with instruments purchased by us, and I beg to enquire whether, and at what price, the Committee will sell the instruments here installed, except the thermograph and barograph. The instruments are: (1) Robinson Anemograph; (2) Beckley Raingauge; (3) 8-inch Raingauge; (4) Stokes Sunshine Recorder; (5) Standard Barometer; (6) Standard Dry- and Wet-bulb Thermometers.

Yours faithfully,
L. BECKER.

The Director,
Meteorological Office,
London, S.W.

Reported—that action in the matter had been postponed pending the decision as to a telegraphic reporting station, about which a letter had been addressed to the Lord Provost of Glasgow, asking for a site and an observer, associated with the Corporation.

374. *National Insurance Act* (Minute 362).—Reported—the receipt of the following certificate:—

NATIONAL INSURANCE ACT, 1911.

CERTIFICATE GRANTED UNDER PART II. (*b*) OF THE FIRST SCHEDULE.

To The Meteorological Committee. (Employer.)

The Joint Committee of the several bodies of Commissioners appointed for the purpose of Part I. of the National Insurance Act, 1911 (hereinafter called "the Act"), acting jointly with the Insurance Commissioners established under the Act, in pursuance of the powers conferred on them by paragraph (*b*) of Part II. of the First Schedule to the Act and by paragraph 16 (*f*) of the National Insurance (Joint Committee) Regulations, 1912, hereby certify that as respects the classified clerks employed by the above-mentioned committee the terms of the employment are such as to secure provision in respect of sickness and disablement on the whole not less favourable than the corresponding benefits conferred by Part. I. of the Act.

Given under the Seal of Office of the aforesaid Joint Committee this fifteenth day of July in the year one thousand nine hundred and twelve.

R. W. HARRIS.

Given under the Seal of Office of the aforesaid Insurance Commissioners this fifteenth day of July in the year one thousand nine hundred and twelve.

L. G. BROCK.

Also—a proof of Circular 002, *Regulations for appointment by the Meteorological Committee*, including the modifications previously approved, in order to qualify the staff for exception by the Commissioners (Minute 354).

375. *Director's Report and Accounts:—*

The Director reported that he had visited the quarters of the Royal Flying Corps at Upavon, in company with Mr. J. S. Dines, on Thursday, 3rd October, and the Royal Aircraft Factory at Farnborough on 4th October, in order to make arrangements for meteorological instruction for the Royal Flying Corps, for which a large supply of instruments has already been ordered from the Office, and the commencement of operations at Farnborough.

International Conference at Paris on Radiotelegraphic Signals (Minute 365).—The Director attended the conference at the Observatory at Paris, which was opened on 15th October, and returned to London on Saturday, 19th October. The conference had not then come to an end, but the chief subject remaining for discussion was a proposal for the establishment of an International Bureau, with its seat at Paris, for the perfection of time-keeping and signalling. As representatives of Great Britain there were present the Astronomer Royal (Mr. F. W. Dyson), the Assistant Hydrographer (Captain John Frankland Parry), and a Naval Superintendent of Wireless (Commander Silvertop). It has been arranged for the four British representatives to meet together and present an identical Report to the Admiralty and the Meteorological Office.

Office Staff.—Reported that W. J. Winter, messenger, had been certified to be suffering from phthisis, and, after making application for sanatorium benefit under the Insurance Act, had been offered and had accepted treatment at the Fairlight Sanatorium, at the expense of Miss Morison, 67, Queen's Gate, S.W.

Full pay for a fortnight from 6th November, and subsequently half pay for a month, subject to further report, was authorised.

Reports of Work for October, 1912.—1. *Marine Division.*—Meteorological Tables for the Admiralty:—Mediterranean Pilot, Part I, completed and forwarded. Japan Pilot in course of completion.

18 Meteorological Logbooks, 2 Abbreviated Meteorological Logbooks; also 137 North Atlantic Registers, 88 Radio-telegraphy Registers, and 17 Indian Ocean Registers, dealt with on receipt.

North Atlantic Meteorological Chart,—issue for November 1912 published. Issue for December 1912 in course of preparation. Indian Ocean Chart for November 1912 published; December in the press; and January in course of preparation.

Monthly limits of icebergs and field ice in the North Atlantic in course of preparation.
Extraction of observations relative to the Yellow Sea :—Data extracted from 5 Logs.
The estimated cost, at rates ordinarily charged, of work done for Public Offices £23 7*s.* 6*d.*

2. *Forecast Division.*—(1) Current work, which now includes plotting the complete observations contributed to the Weekly Weather Report on the back of the working charts, has been kept up to date.

(2) Number of wireless messages has been :—
(*a*) From H.M. Ships, October, 4.
(*b*) From ships of Mercantile Marine, October, 485.
(3) Corrections to Daily Weather Report for September prepared.
(4) Forecast Checking up to end of March.
(5) Wind Frequency tables prepared up to end of June.
(6) Working Charts prepared for binding up to 30th June.
(7) Inquiries :—

Prepaid Replies	22
Other Telegraphic Inquiries	10
Wireless Inquiries	—
Telephone Inquiries	3
Personal Inquiries	9

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, 1912, Parts I. and II., up to date. Part III., section 1, up to date ; Part III., section 2, Copy for March sent to printer. Part IV., section 1 ; Values for Kew (January, February) sent for press ; Eskdalemuir (January) revised, proof received. Copy for March and April for Valencia, Kew and Eskdalemuir sent to printer. Introduction for 1911, revised proof sent to printer. Section 2, Tables LXIX.–LXXII. passed for press. Notes on the Meteorological Tables and Tables of Corrections sent to printer.

The examination of the Observatory records, and Sunshine Cards, the tabulation of cup anemograms, and the summaries of pressure tube anemograms, have been kept up to date.

Daily Averages of Mean, Maximum and Minimum Temperatures at Kew revised to include values for 1901–1910.

Library : 43 Authors' cards and 532 Subject cards prepared for catalogue.

Inquiries as follows :—Newspapers, 7 ; Legal, 20 ; Scientific and Commercial, 41 ; Forecasts, 15 ; General, 3. The receipts in connection with these amounted to £5 17*s.* 4*d.*

4. *Instruments Division.*—Admiralty Work.—Supplies have been sent to four dockyards, including a consignment of 22 aneroids for Portsmouth. Instruments are now ready for despatch to meet the deficiencies shown in the quarterly returns.

Stations, &c.—Instruments have been sent to the Hull agent, and have been supplied directly to seven ships, three lighthouses and two coastguard stations. New storm cones have been sent to 12 ports, and a damaged fishery barometer has been replaced by a good one.

Upper Air.—Boxes for the return of meteorographs found, have been sent to six persons ; one in Ireland and five in England.

Private Requisitions.—Instruments have been supplied to six local authorities and private individuals.

Colonial Requisitions.—Requisitions from Pahang and British Guiana received through the Crown Agents have been completed. The large orders from South Africa and Australia are still in hand.

Investigations and experiments have been made concerning the following :—

1. The Dines P.T. Anemometer with special reference to the new one now under trial at Kew.
2. The float barograph, with special reference to the one at Kew.
3. The microbarograph. In connection with one returned from Cambridge for repairs.
4. Rack barometer. The barometer made by the Cambridge Scientific Instrument Company is now being tested at the Office, and gives consistent results. The dial is found very simple to read.
5. Tables. A table suitable for use at a particular station, for the reduction of barometer readings, from apparent inches to true millibars at sea level, has been prepared.

Workshop.—Orders have been given for the fitting up of the workshop with a precision lathe, a drill, and a grinding machine ; with the necessary shafting, which is to be driven by an electric motor. The work is now in hand.

Present received.—Four thermographs and two hygrographs, originally intended for use in Arctic Expeditions, have been presented to the Office by the Hydrographic Department of the Admiralty.

Fifty frames for the exhibition of Storm Warning Telegrams, Barometer Charts, and Daily Weather Reports have been ordered. A circular dealing with the importance of exhibiting weather information in these frames to the public is in preparation.

5. *Investigation of the Upper Air* (Mr. Dines's report for the quarter ending 30th September, 1912).—Work has been carried on as usual during the quarter. I went to Crinan for the first week in July, and with Mr. Dobson's assistance sent up nine balloons, following them as far as possible with a theodolite. Owing to the persistence of hazy and foggy weather the results are not as good as might be wished, none of the balloons could be followed to any great height, and three records only have been obtained. This is accounted for by the existence of a most unusual upper current from the East, which carried the instruments out to the Atlantic. Of those recovered two were found on the beach, and had obviously been for some time in the sea I take this occasion of stating that Mr. Dobson afforded me most valuable assistance on this occasion.

Mr. Baker had his fortnight's holiday at the end of August and I took a month's holiday from 8th July to 8th August.

The second self-recording barometer is nearly finished and 15 meteorographs have been made for Mr. Hunt, Melbourne, three for kites and 12 for balloons. There appears to be a sale for a

considerable number of these instruments, and the proceeds are being used for the purpose of sending up additional balloons, one in the middle of each week, if the weather seems favourable for its recovery.

Publications.—Report for September and October from Clerk of Publications :—

	September.		October.	
	Received.	Issued.	Received.	Issued.
Daily Weather Report	760	754	780	776
Weekly Weather Report	375	322	375	323
Monthly Weather Report, &c. ...	575 (August)	435	575 (Sept.)	433
Do. do. (Maps)	25 (August)	2	25 (Sept.)	2
Daily Readings	100 (July)	48	100 (August)	48
Geophysical Journal	—	—	150 (to Feb., 1912).	132
Hourly Readings—Meteorological.—				
Kew	—	—	300 (Jan. and Feb.).	—
Eskdale	—	—	—	—
Valencia	—	—	300 (Jan. and Feb.).	—
Monthly Meteorological Charts (Atlantic).	600 monthly to Oct. (3).	540	600 monthly to Nov. (3).	526
Monthly Meteorological Charts (Indian).	—	213	350 (Nov. and Dec.).	300
International Upper Air Observations	—	—	—	—
Seventh Annual Report	25	—	450	363
Cloud Atlas	—	—	—	—
Observer's Handbook (1911) ...	—	3	—	6
"Forecasting Weather"	—	—	—	1
"Structure of the Atmosphere in Clear Weather."	—	—	—	1
Geophysical Memoirs, No. 1 ...	—	5	—	9
No. 2 ...	—	1	—	4
No. 3 ...	—	1	—	2
No. 4 ...	—	1	—	2

Receipts from sales at M.O.—September, £1 1*s.* 7*d.* ; October, £1 19*s.* 4*d.*

New Publications.—Barometer Manual : Final revise of seventh edition received. Hourly Values—Geophysical Section : The whole of the publication has been received in proof. Sigs. 1, 9, 10, 11, and 12 not yet signed for press. The seventh annual report has been received and issued. 170 stitched copies of the Geophysical Journal, 1911, have been issued.

M.O. Press.—During the month ended 31st October, 1912, the issue of the Periodical Publications has been as follows, namely :—

Daily Weather Report.—As contract.
Maps for the Weekly Weather Report.—As contract.
Maps for the Monthly Weather Report.—As contract.
Monthly Meteorological Charts, North Atlantic.—As contract.
" " " Indian Ocean.—As contract.

On 1st October, 1912, there were three requisitions for forms, diagrams, &c., outstanding, including one for 10,000 copies of each of seven plates for the new edition of the "Barometer Manual for the use of Seamen." Since that date three requisitions have been issued and two discharged leaving four requisitions still in hand.

605 additional copies of the Daily Weather Report have been printed during the month in compliance with requests received from Educational Authorities.

M.O. Observatories (October).—Kew.—The barograph, thermograph, and anemograph (Robinson Cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the office.

The following absolute observations have been made :—

Magnetic	Declination	4
	Inclination	4
	Horizontal Force	4
Potential Gradient	on	18 days.
Wilson Apparatus	"	14 "
Ebert "	"	8 "
Pyrheliometer	"	9 "

Quick runs of the magnetograph in connection with the Australasian Antarctic Expedition were made on two days and International Cloud Observations on five days.

The retirement on pension of Mr. T. W. Baker on 30th September, has raised the question of future provision for the taking of the absolute magnetic observations and the testing of magnetic instruments. The absolute observations since that event have been taken by Mr. J. W. Boxall (of the N.P.L. staff) and the Superintendent, Mr. Francis in the meantime practising observations.

Mr. Gordon Dobson before moving to Farnborough made some observations on the vertical electric current indicated by the Wilson apparatus at different heights above the ground and with guard rings of different sizes.

The data for the July number of the Geophysical Journal have been prepared and sent to the Office.

The working standard barometer, Newman No. 34, has been cleaned.

Experiments have been continued with the Float Barograph, and comparisons have been made of the Pressure Tube Anemometer scale and the water gauge.

On the 24th the Observatory was visited by a party of 15 from H.M. Navigation School at Portsmouth.

Photographic paper has been supplied to Eskdalemuir and Valencia Observatories and the India Office.

Eskdalemuir.—Buildings.—The assistant architect inspected the magnet house, and a report is to be sent to the Meteorological Office.

Staff.—Mr. Southerns left on October 8th.

Meteorology.—The normal observations and tabulations have been made.

Magnetism.—The normal observations and tabulations have been made. The V.F. magnet is still giving grave cause for dissatisfaction.

Seismology.—The instruments have been in satisfactory order.

Electricity.—The usual tabulations have been made. Spiders have been less troublesome than usual at this season.

An observation with Ebert's apparatus was obtained.

Solar Radiation.—An observation was obtained.

Accounts:—Submitted—The following statement:—

	£	*s.*	*d.*
Bank balance on 30th September, 1912	528	12	9
Receipts from 1st to 31st October, 1912	5,419	19	7
	5,948	12	4
Cheques drawn from 1st to 31st October, 1912	2,392	4	2
Bank balance on 31st October, 1912	£3,556	8	2

Travelling Expenses.—The Director's travelling expenses to Paris, £10 13*s.* 6*d.*, and to Upavon and Farnborough, £3 1*s.* 10*d.*, were reported.

FORTY-SIXTH MEETING.

South Kensington, S.W., 4th December, 1912.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

CAPTAIN HARVEY. | THE HYDROGRAPHER.

DR. SCHUSTER.

376. The Minutes (368–375) of the last Meeting (6th November, 1912) were read and confirmed.

377. *Programme of Publications for* 1913–14 (Minute 370).—Submitted—the following :—

RETURN of PUBLICATIONS issued by the METEOROLOGICAL COMMITTEE during the financial year 1911–12, showing in each case the COST of PRINTING, &c., and the AMOUNTS RECOVERED by SALES during the year.

1910–11.		Publication.	1911–12.	
Cost of Printing and Paper.	Sales through Stationery Office Agents.		Cost of Printing and Paper.	Sales through Stationery Office Agents.
£ s. d.	£ s. d.		£ s. d.	£ s. d.
495 15 4	—	Daily Weather Report	499 3 1	—
—	—	Appendix to Daily Weather Report	15 11 5	—
442 19 2	52 15 0	Weekly Weather Report (including Monthly and Annual Summaries).	461 19 10*	46 12 4
50 5 7	—	Weekly Weather Report, Appendices to.	43 10 5	—
238 12 1	7 3 0	Monthly Pilot Charts (Indian Ocean)	208 6 4	7 19 0
236 3 9	13 17 8	„ „ (North Atlantic, &c.)	247 1 11	11 10 0
162 5 5	—	Hourly Readings	106 12 10†	—
125 0 6	—	Daily Readings (S.S.O. 1907) ...	—	—
113 3 7	2 18 4	„ „ (S.S.O. 1910) ...	—	—
—	—	„ „	76 17 0	—
—	—	Geophysical Journal...	31 5 6	—
52 14 1‡	12 11 6	Annual Report, with Appendices ...	64 7 0§	13 19 0
48 18 10	1 2 0	Trade Winds of the Atlantic ...	—	—
23 10 7	—	Observer's Handbook	26 3 6	12 16 0**
37 8 1	—	Meteorological Log	31 8 4	—
—	—	Hourly Values—Geophysical Section —(Specimen Sheet).	6 5 0	—
17 9 0	—	Outline Map of the World	—	—
1 6 3	—	Maritime Weather Signals Commission. Report.	—	—
—	—	International Meteorological Committee. Report 9th meeting.	49 4 3	1 10 0
39 13 10	—	Meteorological Committee Minutes	—	—
—	—	Aeronautics. Extract from Second Report.	2 16 5	—
2,085 6 1††	90 7 6		1,870 12 10‡‡	94 6 4
	33 19 4	Miscellaneous Sales of earlier Publications.		23 6 5
	47 4 1	Sales by Meteorological Office ...		52 9 9
	171 10 11			170 2 6

* This amount includes the sum of £4 1*s.* 8*d.*, the cost of copies supplied to the Royal Meteorological Society on repayment.

† For January to October, 1911, only.

‡ This amount includes the sum of £32 9*s.* 8*d.*, the cost of copies supplied to the Meteorological Office on repayment.

§ This amount includes the sum of £39 17*s.* 4*d.*, the cost of copies supplied to the Meteorological Office on repayment.

** This amount is the sum realised by sales of the 1910 edition.

†† This amount includes the sum of £1,744, the cost of Official Publications supplied to the Meteorological Office for Departmental use, &c., during 1910–11.

‡‡ This amount includes the sum of £1,537, the cost of Official Publications supplied to the Meteorological Office for Departmental use, &c., during 1911–12.

STATEMENT showing the EXPENDITURE by H.M. STATIONERY OFFICE for PRINTING, STATIONERY, &C., for the METEOROLOGICAL OFFICE.

——	Printing.	Paper.	Binding.	Books.	Stores.	Total.
	£	£	£	£	£	£
1911–12	1,529*	348*	180*	7	32	2,096*
1910–11	1,640*	341*	169*	7	46	2,203*

* These amounts include the cost of copies of Official Publications supplied for Departmental purposes.

378. *Meteorological Office Observatories.—Appointment of Superintendent of Eskdale Observatory* (Minute 372).—At a meeting of the Gassiot Committee held on 27th November, 1912, by the request of the Director, a sub-committee consisting of Dr. Glazebrook, Captain Lyons, Dr. Schuster, and the Director was appointed to consider the regulations for the office of Superintendent of the Observatory as from 15th May, 1913.

Read—M.O. 4,457 from Mr. Walker, dated 2nd December, 1912, intimating his resignation of his appointment as from 31st December and his wish to leave the Observatory at that date.

The Director was instructed to accept the resignation and to inform the President of the Royal Society.

He was also requested to make temporary arrangements for carrying on the work of the Observatory pending the appointment of a new superintendent.

Magnet House at Eskdalemuir (Minute 372).—Read—the following communication from the Magnetic Sub-Committee of the Gassiot Committee :—

M.O. 4,457.

Meteorological Office, Central Observatory,
Kew Observatory,
Richmond, Surrey,
2nd December, 1912.

DEAR DR. SHAW,

IN reply to your letter, C. 58 of 18th November, respecting the outbreak of dry-rot at Eskdalemuir, the Report from H.M. Office of Works and the letter from Mr. Walker which you sent were duly brought before the Gassiot Sub-Committee on Magnetic Observations at their meeting on 28th November, and I was instructed to send you the enclosed extract from the Minutes of the meeting embodying the opinion of the Sub-Committee.

I am, &c.,
CHARLES CHREE,
Secretary, Gassiot Committee.

EXTRACT from MINUTES of MEETING of the GASSIOT SUB-COMMITTEE on MAGNETIC OBSERVATIONS, held on 28TH NOVEMBER, 1912.

The Sub-Committee having considered the report from the Office of Works, approve the immediate execution of the work specified in the first two proposals.

The proposals for the work to be carried out next year are of a technical character, and the Sub-Committee hesitate to express a definite opinion on them, but so far as they can judge they appear to be reasonably satisfactory under present conditions. Before, however, a decision is taken as to a new covering for the roof, the Sub-Committee think that inquiry should be made as to the additional weight the walls would have to carry, and also as to the properties of the new material in respect to conduction of heat. A possible alternative to the proposed granolithic covering might be soil of a less spongy character. The magnetic character of whatever substance is used should be examined before adoption.

With regard to the question raised by Mr. Walker as to the experimental piers resting on asphalte, it should be definitely ascertained whether this is the case. Interfering with the piers now would probably cause a serious interruption of the work, which it would be unwise to sanction unless definite evidence exists that the accuracy of the records is affected by the yielding of the piers.

The attention of H.M. Office of Works should be drawn to the extreme importance of keeping up the continuity of the records.

Although some interruption is no doubt unavoidable, the work should be arranged in such a manner as to reduce it to a minimum.

Structural alterations at Kew Observatory (Minute 372).—Read—the following letter from the Office of Works :—

M.O. 4,495.

H.M. Office of Works,
Storey's Gate,
Westminster, S.W.
3rd December, 1912.

SIR,

WITH reference to your letter of the 21st ultimo, No. 3893/C. 53, on the subject of the proposed structural alterations at Kew Observatory, I am directed by the First Commissioner of His Majesty's Works, &c., to state that the Board have taken note of the fact that the Observatory will probably not be free before the 1st April.

The Board will at any rate make provision as requested, for the commencement of the work on that date.

I am, &c.,
H. J. HAPGOOD.

The Director,
Meteorological Office,

379. *Estimates for* 1913–14 (Minute 371).—Read—the following memorandum accompanying the draft estimates :—

ESTIMATES, 1913–14.

The summary of the results herewith is as follows :—

	£
Corrected estimate of expenditure shown in ordinary type	25,856
New items, shown in italic	2,345
Total estimated expenditure	28,201
Less appropriations in aid	5,850
Net estimated expenditure	22,351
	£
Grant for 1912–13	17,000
Grants paid through other bodies...	1,400
	18,400
Estimated deficiency...	£3,951

The sum totals of the items shown in the memorandum printed on p. 231 is £4,068. The difference of £117 is accounted for by the automatic increase of appropriations in aid. It should be remembered that £165 will be required in 1914–15 for ordinary increases of salary following new appointments after recent retirements.

W. N. SHAW.

Meteorological Office,
28th November, 1912.

Submitted—the following first draft of estimates for the year 1913–14 :—

METEOROLOGICAL OFFICE. Estimates for Year 1913–14.

Heads of Service.	Proposed for 1913–14.	Voted for 1912–13.	1913–14. Increase.	1913–14. Decrease.
	£	£	£	£
Director	1,000	1,000	—	—
Salaries :—Office ... ... + *415*	8,711	8,776	—	65
„ Observatories ... ... + *795*	3,478	3,336	142	—
Other expenses of Observatories	1,313	1,045	268	—
Office expenses :				
Rent, fuel and lighting	735	730	5	—
Repairs, furniture, and incidental expenses	470	405	65	—
Postage	660	650	10	—
Telegrams ... ... + *220*	2,940	2,475	465	—
Travelling expenses	400	340	60	—
Superannuation allowances (operative) ...	1,573	1,383	190	—
„ fund ... ... + *465*	—	—	—	—
Cost of instruments ... ... + *450*	2,310	2,310	—	—
Auxiliary observatories, &c.	2,266	2,231	35	—
Totals ... ... + *2,345*	25,856	24,681	1,240	65
Appropriations in Aid :				
Observatories : Subventions	462	2,380	—	1,697
„ Local expenses refunded ...	221			
„ Office expenses refunded ...	90	48	42	—
Departmental expenses refunded	455	435	20	—
Incidental expenses refunded	515	495	20	—
Telegraph expenses refunded	600	560	40	—
Inspections	160	—	160	—
Cost of instruments (Navy)	510	510	—	—
„ „ (other sources)... ...	1,500	1,500	—	—
Superannuation	887	800	87	—
Lectures and experiments	450	400	50	—
From balance in hand	—	553	—	553
Totals	5,850	7,681	419	2,250
Net charge on Grant ... ... + *2,345*	20,006	17,000		
Parliamentary Grant	—	17,000		

NOTE.—In setting out the estimate the sums required to meet the existing charges are shown in the column "Proposed for 1913–14." The additional sums necessary to meet new charges referred to in the accompanying letter and memorandum are shown in *italic* with the sign + prefixed.

25737—20

METEOROLOGICAL OFFICE.

PROVISIONAL STATEMENT OF CHARGES UPON THE GRANT FOR 1913–14 REQUIRED FOR WORK SANCTIONED FOR THE YEAR.

I.—SALARIES, including normal increases: OFFICE AND OBSERVATORIES (Salaries marked * are affected by Allowances).

Establishment.	—	Administration.		I. Marine Division.		II. Forecast Division.		III. Statistical Division.		IV. Instruments Division.		V. Unassigned.		Kew.	Eskdale.	Valencia.	Falmouth.	Farnborough.	Pyrton Hill.	1913–14.		1912–13.	
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
	Director £1,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,000	...	1,000
	Secretary	...	300	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	300	...	288	...
	Chief Clerk and Cashier ...	...	330	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	330	...	330	...
																					(2) 630		(2) 618
	Divisional Staff:																						
7	Superintendents	...	...	...	450	...	425	..	400	...	463	...	...	657	450*	275*	...	...	...	...	(7) 3,120	...	(7) 3,032
5	Meteorologists	...	...	...	...	...	(3)922	...	...	...	...	...	...	...	...	...	...	250	200	(5)1,372	...	(5)1,310	...
1	Magneticians	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12	...	...	...	12	...	12	...
2	Seismologists	...	...	...	...	...	...	...	...	...	...	...	...	...	213	...	...	...	...	213	...	200	...
	Principal Assistants ...	...	...	...	275	...	...	...	260	...	...	...	...	...	...	...	...	...	...	(2) 535	...	(2) 525	...
	Professional Assistants ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	Graduate Assistants ...	...	...	...	...	...	60	...	...	...	...	...	60	...	...	...	...	...	...	(2) 120	...	(2) 120	...
	Clerical and Technical Assistants:																				(10) 2,252		(10) 2,167
7	Class II.	...	...	...	200	...	...	...	(3)555	...	200	...	...	...	...	...	...	...	...	(5) 955	...	(6)1,195	...
5	Class III.	...	150	...	(2)275	...	(2)330	...	(2)300	...	...	...	...	...	...	...	...	...	...	(7)1,055	...	(6) 950	...
	Clerk Assistants... ...	...	(2)210	...	...	...	141	...	(3)270	...	...	...	...	(2)305*	150*	...	...	...	...	(9)1,076	...	(7) 830	...
	Mechanical Assistants ...	...	...	...	...	...	...	...	...	...	130	...	...	...	115*	...	...	...	130	(3) 375	...	(3) 364	...
10	Class IV.	...	...	...	75	...	110	...	110	...	...	...	...	...	110*	...	...	...	...	(4) 405	...	(5) 563	...
	Allowance for Vacancies	...	...	...	...	...	...	...	...	...	...	...	25	...	...	...	...	...	...	25	...	...	...
																					(28) 3,891		(27) 3,902
5	Women Clerks	...	100	...	(3)300	...	...	...	...	...	...	...	100	...	...	...	...	...	...	(5) 500	...	(5) 495	...
	Supernumerary Clerks...	...	...	...	...	...	...	...	(2)150	...	52	...	...	65	...	82	...	65	...	(6) 414	...	(6) 396	...
	Probationers	...	...	...	...	...	50	...	...	...	...	...	...	...	...	...	...	...	...	50	...	52	...
	Boy Clerks	...	44	...	(2) 84	...	60	...	41	...	...	...	...	52	...	...	...	...	...	(6) 281	...	(6) 256	...
	Office or Laboratory Boys	...	26	...	...	...	...	...	35	...	35	...	...	...	...	...	...	...	...	(3) 96	...	(3) 79	...
																					(21) 1,341		(21) 1,278
	Office Keeper's Staff:																						
2	Office Keepers	...	(2)195	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(2) 195	...	(2) 193	...
1	Caretakers	...	...	...	...	...	...	...	...	...	...	...	...	82	...	...	...	...	...	82	...	82	...
5	Messengers	...	(3)186	...	...	...	...	...	...	...	...	...	...	...	52	39	...	...	...	(5) 277	...	}	
2	Boy Messengers	...	26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(1) 26	...	(6) 334	...
5	Cleaners	...	(4)122	...	..	...	...	...	...	...	...	...	...	...	...	34	...	...	...	(5) 156	...	(4) 122	...
	Watchman	...	26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	26	...	30	...
	Lift Attendant	...	53	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	53	...	50	...
																					(16) 815		(15) 811
	Overtime	...	...	...	...	...	...	...	...	...	...	...	...	110	...	...	...	...	...	110	...	52	...
	Allowance for Revision ...	...	...	...	...	...	...	...	...	...	...	...	...	...	30	...	...	...	...	30	...	21	...
																					140		73
	TOTALS ...£1,000	...	1,768	...	1,659	...	2,098	...	2,121	...	880	...	185	1,271	1,120	442	...	315	330	...	(84) 13,189	...	(82) 12,881

NOTE.—The number of persons, when more than 1, is shown in brackets.

II.—CHARGES upon the GRANT (exclusive of Salaries.)

—	Administration.		Lectures and Experiments.		Inspections.		I.—Marine.		II.—Forecasts and Storm Warnings.		III.—Statistics, Library and Climatology.		IV.—Instruments, Observatories and unassigned.		No.	Total.	
Office Expenses.	£	£	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Rent, Fuel, and Lighting	685	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attendance on Heating and Lighting Apparatus (H.M.O.W.)	... 50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		735	...	...	...	...	...	...	...	...	...	...	...	...	...	735	...
Repairs and Furniture	...	150	...	...	...	...	...	...	...	...	...	...	...	...	...	150	...
Incidental Expenses (exclusive of Postage):—																	
Carriage of Parcels	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Books and Printing (inclusive of S.O.P.)	135	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Office-Keeper Contingencies	110	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Telephones, &c.	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		320	...	...	...	...	...	...	...	...	...	...	...	...	...	320	...
																	1,205
Postage and Telegrams.																	
Postage	...	310	...	...	...	...	...	...	...	350	...	...	...	...	...	660	...
Telegrams from Inland Stations and H.M. Ships	...	...	...	...	...	...	...	...	560	...	...	...	...	...	...	...	...
,, from Mercantile Marine	...	...	...	...	...	...	...	...	340	...	...	...	...	...	...	...	...
,, from Abroad	...	...	...	...	...	...	...	...	390	...	...	...	...	...	...	...	...
,, ,, New P.O. charge	...	...	...	...	...	...	...	...	400	...	...	...	...	...	...	...	...
,, sent Abroad	...	...	...	...	...	...	...	...	525	...	...	...	...	...	...	...	...
,, Storm Warnings	...	...	...	...	...	...	...	...	350	...	...	...	...	...	...	...	...
,, Hay Harvest Forecasts	...	...	...	...	...	...	...	...	65	...	...	...	...	...	...	...	...
,, Sundries, Forecasts, &c.	...	...	...	...	...	...	...	...	100	...	...	...	...	...	...	...	...
Allowances to Clerks	...	...	...	...	...	...	...	...	135	...	...	...	...	...	...	...	...
Post Office Charges for Special Attendances at South Kensington	...	...	...	...	...	...	...	...	75	...	...	...	...	...	...	...	...
										2,940	...	...	...	...	...	2,940	...
																	3,600
Travelling Expenses.																	
Committee, &c.	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Representatives at International Meetings	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Inspectors, M.O.	...	...	...	...	260	...	...	...	...	...	...	...	...	...	...	...	...
,, Scottish	...	...	...	...	50	...	...	...	...	...	...	...	...	...	...	...	...
		90	...	...		310	...	...	...	...	...	...	...	...	...	...	400
Superannuation.																	
Mr. Scott	400	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Annuities	150	...	...	...	...	...	300	...	150	...	112	...	175	...	...	...	...
Mr. Francis	...	...	...	...	...	...	...	...	76	...	...	...	...	...	...	...	...
Mr. Call	...	...	...	...	...	...	...	...	...	...	...	...	60	...	...	...	...
Mr. Allen	73	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mr. Thompson	...	...	...	...	...	...	77	...	...	...	...	...	...	...	...	...	...
		(3) 623	...	...	...	...		(3) 377		(2) 226		(1) 112		(2) 235	11	1,573	...
Contribution for Superannuation of Clerks	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
																	1,573
Cost of Instruments.																	
Royal Navy	...	...	...	...	...	...	...	...	...	...	...	...	510	...	...	...	...
For Office use	...	...	...	...	...	...	...	...	...	...	...	...	300	...	...	...	...
Other Commissions	...	...	...	...	...	...	...	...	...	...	...	...	1,500	...	...	...	...
														2,310	...	...	2,310
Observatories, Kew, Eskdale, Valencia, Farnborough, and Pyrton Hill (expenses exclusive of salaries, *see* p. 228)	...	...	...	...	...	...	...	...	...	...	...	...	...	1,313	...	...	1,313

Allowances for other Observatories, Observers, &c.	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Aberdeen Observatory	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Armagh do.	...	...	...	...	...	...	...	...	...	...	...	...	295	...	...	...	...
Falmouth do.	...	...	...	...	...	...	...	...	...	...	...	...	50	...	...	...	...
Anemograph Stations (including St. Helena)	...	...	...	...	...	...	...	...	...	...	...	...	250	...	...	...	...
													(7) 70	...	...	...	...
														665	7	665	...
Incidental Expenses, Forms, &c.	...	...	...	...	...	...	...	...	...	...	...	...	...	210	...	210	..
Reporters at Telegraphic Stations	...	...	...	...	...	...	...	...	...	650	...	...	...	...	27	650	...
Meteorological Societies :—																	
Second Order Stations	...	...	...	...	...	...	...	...	...	...	75	...	...	...	...	...	...
Weekly Reports	...	...	...	...	...	...	...	...	...	...	25	...	...	...	...	...	...
British Rainfall	...	...	...	...	...	...	...	...	...	...	25	...	...	...	...	...	...
Salary of Scottish Inspector	...	...	...	...	50	...	...	...	...	...	...	...	...	...	1	...	...
Royal Meteorological Society	...	...	...	...	...	...	...	...	...	...	50	...	...	...	...	...	...
						(1) 50	...	...	...	...		175	...	...	...	225	...
Schuster Reader	...	...	...	350	...	...	...	...	...	...	...	...	...	...	1	350	...
Agents' Fees (Marine)	...	...	...	...	...	...	...	110	...	...	...	...	...	...	...	110	...
Presentation Labels	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	6	...
Lectures, &c.	...	...	...	50	...	...	...	...	...	...	...	...	...	...	...	50	...
																	2,266
Total Expenses exclusive of salaries	...	2,228	...	400	...	360	...	493	...	4,166	...	287	...	4,733	47	...	12,667
Salaries ... £1,000	...	1,768	...	...	...	...	...	1,659	...	2,098	...	2,121	...	4,543	...	...	13,189
Totals (*Dr.*) ... £1,000	...	3,996	...	400	...	360	...	2,152	...	6,264	...	2,408	...	9,276	...	...	25,856

III.—Estimated Appropriations in Aid.

Appropriations in Aid.	£	£	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Observatories (*see* p. 228)	...	...	...	...	...	...	...	...	...	...	...	...	...	462	...	462	...
,, Incidental Expenses refunded	...	...	...	...	...	...	...	...	...	...	...	...	...	221	...	221	...
,, Sun Cards, &c.	...	...	...	...	...	...	...	...	...	...	...	...	...	90	...	90	...
																	773
Departmental Expenses	...	5	...	...	...	...	...	5	...	200	...	115	...	130	...	...	455
Incidental Expenses	...	60	...	...	...	...	...	...	...	400	...	...	...	5	...	465	...
,, ,, S.O. Account	...	50	...	...	...	...	...	...	...	...	...	...	...	...	...	50	...
Telegraphic Expenses repaid :—																	515
Home	...	...	...	...	...	...	...	...	...	220	...	...	...	...	...	220	...
Foreign	...	...	...	...	...	...	...	...	...	380	...	...	...	...	...	380	...
																	600
Inspection Expenses repaid	...	...	...	...	...	160	...	...	...	...	...	...	...	...	...	...	160
Cost of Instruments, &c., refunded—Navy	...	...	...	...	...	...	...	...	...	...	...	...	...	510	...	510	...
,, ,, ,, Other Sources	...	...	...	...	...	...	...	...	...	...	...	...	...	1,500	...	1,500	...
																	2,010
Superannuation :—																	
Annuity Receipts	...	(1) 150	...	...	...	...	...	(2) 300	...	(1) 150	...	(1) 112	...	(1) 150	...	862	...
Interest	...	25	...	...	...	...	...	...	...	...	...	...	...	...	...	25	...
																	887
Lectures and Experiments :—																	
Schuster Readership	...	...	...	350	...	...	...	...	...	...	...	...	...	...	...	350	...
Other Sources	...	...	...	100	...	...	...	...	...	...	...	...	...	...	...	100	...
																	450
Totals (*Cr.*)	...	290	...	450	...	160	...	305	...	1,350	...	227	...	4,450	...	...	5,850
NET TOTALS ... £1,000	...	3,706	...	*Cr.* 50	...	200	...	1,847	...	4,914	...	2,181	...	6,208	...	...	20,006
Parliamentary Grant	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

IV.—Meteorological Office Observatories.

Estimated Expenses for 1913–14.

—	Kew.		Eskdale.		Valencia.		Falmouth.		South Farnborough.		Pyrton Hill.		Totals.	
	1913–14.	1912–13.	1913–14.	1912–13.	1913–14.	1912–13.	1913–14.	1912–13.	1913–14.	1912–13.	1913–14.	1912–13.	1913–14.	1912–13.
	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Salaries (*see* I.)	1,271	1,222	1,120	1,046	442	430	—	—	315	275	330	330	3,478	3,303
Rent, Fuel, and Lighting	120	100	75	55	23	23	—	—	—	—	—	—	218	178
Repairs, Furniture, &c., including new instruments	250	150	85	65	75	—	—	—						
					45	30	—	—						
Insurances	10	15	10	14	—	—	—	—						
Materials	60	50	55	40	—	—	—	—						
Books, Printing and Stationery	15	15	25	25	—	—	—	—	85	125	120	120	1,045	829
Incidental Expenses	70	52	45	35	12	34	—	—						
Private Wire	—	—	30	30	13	13	—	—						
Travelling Expenses	—	—	40	16	—	—	—	—						
Contribution to International Publication	—	—	—	—	—	—	—	—	—	—	50	50	50	50
Totals	1,796	1,604	1,485	1,326	610	530	—	—	400	400	500	500	4,791	4,360

Appropriations in Aid.

	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Royal Society	—	—	—	1,200	12	12	—	—	—	—	—	—	12	1,212
Gassiot Fund	450	450	—	—	—	—	—	—	—	—	—	—	450	450
National Physical Laboratory	50	250	—	—	—	—	—	—	—	—	—	—	50	250
Grazing Rent	5	5	—	—	18	18	—	—	—	—	—	—	23	23
Commissions, &c.	85	45	—	—	—	—	—	—	—	—	—	—	85	45
Advisory Committee for Aeronautics	—	—	—	—	—	—	—	—	—	400	—	—	—	400
Rent of Rooms at Eskdale	—	—	63	—	—	—	—	—	—	—	—	—	63	—
Totals	590	750	63	1,200	30	30	—	—	—	400	—	—	683	2,380
Net Charge on Grant	1,206	854	1,422	126	580	500	—	—	400	—	500	500	4,108	1,980

A draft letter to the Treasury was submitted, amended, and approved as follows :—

SIR, 6th December, 1912.

IN presenting an estimate of the expenses of the Meteorological Office for the year 1913–14, in reply to your letter of the 8th October, 1912 (19675), the Meteorological Committee find it necessary to refer to their letter of the 11th December last in which they presented an estimate for the current year. The total of the estimate was in excess of the grant for Meteorology by £603, and the Committee proposed to take that sum out of their current balance. No application was, therefore, made for an increase of the grant to meet the estimated deficit for 1912–13, but an appeal was made for £200 a year for a special purpose.

2. In reply, Their Lordships were good enough to say that they would ask Parliament to increase the grant by £150 a year, and they added an expression of Their trust that the Committee would be able to make that sum suffice for the future.

3. The Committee have given special attention to this expression in Their Lordships' letter. Of the £150 increase they devoted £100 to the special purpose indicated, in modified form, leaving £50 for general purposes. At some risk to the continuity of their body of Statistics for Agricultural and Sanitary purposes, they have given notice to terminate grants amounting to £131 to two observatories established in 1868, intending to replace them by two telegraphic reporting stations in Scotland, the necessity for which had been pointed out in Parliament. The net saving is estimated at £31. They have further introduced a scheme for charging a round sum of £4 for costs of inspection against the several Health Resorts which send daily telegrams for communication to newspapers. They have received £160 on that account, securing a net economy of £100. They had thus reduced the estimated deficit for the future to £422. Unfortunately the recent correspondence with the Post Office about new charges led to a claim on the part of the Postmaster General, hitherto overlooked by him, for £400 a year additional payment for services already rendered, as reported to Their Lordships in a letter dated 11th July, 1912.

4. The Committee must refer again to their letter of the 11th December, and recall that in the year 1913-14 certain charges in connexion with the Observatories have to be met. They estimate these charges at £700, of which £250 is a capital charge. The Committee must, therefore, look forward to a deficit of £1,599 in the year 1913–14 if their present work is maintained, and the grant remains at its present figure. There are, besides, other items in connexion with the Office and Observatories which have been disclosed in the working of the establishments as representing additional expenditure urgently required for the maintenance of a proper standard of efficiency.

5. Taking these items in conjunction with those already mentioned, the Committee find that they have to consider the following requirements :—

	£
Increase of charges for the Office	2,497
„ „ „ „ „ Observatories	1,571
	£4,068

The several items are set out with explanatory notes in a memorandum appended to this letter. Herein the Committee desire me to ask Their Lordships' attention to some considerations of a more general character.

6. Of the increase of charges for the Office, about £1,412 is accounted for by the more expensive conditions and the very largely increased work, on ordinary lines, at the new premises. As compared, for example, with 1909–10, the estimate of cost of telegrams has increased from £1,895 to £2,805, though the only additional service is that of wireless telegraphy costing £400—an index of increased charges—and the estimated cost of postage has advanced from £430 to £660, an index, not only of increased work, but of increased appreciation on the part of the public, because during the past few years the regulations for gratuitous service on the part of the Office have been made more stringent.

7. The remainder of the sum for the Office, £806, should be taken in conjunction with a sum of £500 which is included in the items for Observatories, making in all £1,306 for the further development of the Meteorological Service.

8. This sum is accounted for partly by the additional work thrown upon the Director and the central staff of the Office in connexion with International Meteorology, and their responsibility in respect of the Meteorology of the Globe. The Office now holds a leading position in international meteorological affairs, and although it involves some work and expense, the Committee cannot suppose that Their Lordships wish the position to be abandoned. Another part is due to the fact that, as regards technical qualifications, the personnel of the staff of the office may now fairly be regarded as adequate for the demands made upon it, and after long preparation the Office is prepared to face its responsibility to the public. The method, hitherto somewhat tentative, which is followed in the Office, and in the development of which this country has had a leading share, is now universally adopted for meteorological service, and for us it now remains to make the best possible use of it.

9. The method resolves itself into two parts, first, the collection of the necessary information and secondly, the discussion of the information and its application to practical purposes. Up to quite recently not only has the information been inadequate but the means of dealing with it still more so With some additions, indicated in the memorandum, the Office should be able to secure the necessary information, and, what is more important, it is now in a position to deal with it. Consequently it is ready to develop its utility. It is prepared to take in hand next year the storm signal service which at present can only be described as ludicrous by any who are really acquainted with it. For this purpose a certain provision is necessary.

10. But the chief part of the additional expense is concerned with the placing of the service now organised upon a stable basis, and especially the provision of a junior staff of trained meteorologists who will conduct regular investigations at the Observatories, and will be available for the chief appointments at the Office when called upon. At present no member of the trained staff can be spared from his duties, even for a time, without serious inconvenience. The immediate purpose of the Office is the saving of life and property at sea and on land. Up to now its duties towards the land have been concerned more with property than with life, and for the sea, where the saving of life has always been an important consideration, the central Office has so far been regarded as sufficient. But within the past two years the Army Council and the Committee of Imperial Defence have laid upon the Office certain duties as regards the saving of life in connexion with aeronautics. Their Lordships will agree that when it is a question of life and death it is not permissible that the Office should send out an untrained man for responsible duties which the War Office rightly claims to have performed, and at present there are no trained men to send. Training for work of this kind is a matter of long practice which can only be obtained in the Meteorological Office establishments. As things stand, the organisation of the Office has just one man qualified for each post and no more. Not only have the Committee to face the inability to supply the Army Council's requirements in matters of life and death, but the failure through ill-health or otherwise of any one of a numerous staff of technical experts might at any time throw the whole institution into confusion. In fact the difficulty has already arisen. To have to take an untrained man for every vacancy places the Committee in a most difficult position. It is, therefore, imperative not only that the present staff should be adequately remunerated but that there should be an adequate number of persons in training to meet the demands that might arise for the more responsible positions in connexion with the application of Meteorology and the allied subjects to practical life. At the same time there are demands on an international basis for new observations by pilot balloons, cloud observations, and other means of investigating the upper air, which form an appropriate part of the training already described as necessary. Hence the Committee desire strongly to impress upon Their Lordships the necessity for making suitable provision for the existing scientific staff at the Office and Observatories, and also for a junior staff in training.

11. Their Lordships will note that the Committee have made some effort to raise the necessary funds by charges for services rendered. The only further possibility in that direction, so far as they know, is to make a charge to newspapers and press agencies for the weather information which forms the basis of many columns in the daily papers. The Committee have considered the matter and think they would be ill-advised to attempt to raise any large sum in that way. They are informed that the press agencies claim that they include the weather information in their reports not for profit but as a public service, and it must be remembered that the evening work originally paid for by "The Times" was definitely taken over by Government. The newspapers do perform a public service by giving publicity to the information collected by the Office, and any other system of distribution would be much more costly.

12. The Committee desire finally to refer to the remaining sum of £820 for Observatories. This is the sum estimated as necessary for the maintenance of observations in Terrestrial Magnetism, Atmospheric Electricity, and Seismology at the Observatories of Kew and Eskdalemuir. This is on a slightly different footing from the other sums mentioned. Their Lordships have not yet definitely undertaken the responsibility for the maintenance of these subjects, except in so far as they have authorised the Committee to take over the administration of Kew Observatory and its off-shoot Eskdalemuir.

13. The alternative to the grant here asked for appears to be that the members of the Committee should make a public appeal for funds to support these important subjects. There is little doubt that if Their Lordships definitely refused to consider an application on behalf of these subjects, by setting out all the facts a strong case could be made out for private support; but the Committee is not a very good body for conducting such an appeal, and considering that these subjects have not yet found their appropriate place in the curriculum of British Universities, and that, although they are of great practical importance, there is little encouragement for this study except in the establishments of the Meteorological Office, they venture to appeal to Their Lordships on educational as well as practical grounds for their support.

14. The Committee have already pointed out that, although the provision for Eskdalemuir is by a grant-in-aid to the Royal Society, for the past two years no steps have been taken to make good the loss to the Meteorological Office due to the deficit in the accounts of the Observatory. The Committee, therefore, consider that in future the grant should be included with the grant for Meteorology. The same is the case with the grant of £400 for the Branch Office at South Farnborough, the responsibility for which the Committee undertook at the request of the Army Council with Their Lordships' sanction (Treasury Letter 3435/11). Hitherto the funds for such work as has been done, have been drawn from the grant to the Advisory Committee for Aeronautics, but when the regular work is once begun, as it should be in 1913–14, there is no reason for continuing that arrangement.

In desiring me to ask you to submit these matters for the consideration of Their Lordships the Committee gave their attention to the general question of the fixing of the grant for definite periods.

In preparing the estimate which is here presented they have confined themselves to the items which are necessary to carry on the work for next year, and have not set out any margin for contingencies, without which the administration of a fixed grant presents insuperable difficulties. There are, for example, normal increases of salary according to scale amounting to £165 per annum, which must be provided for in the following years if the institution is to be maintained. At the same time a number of the items in the estimate represent capital or terminable expenditure, and taking account of these the Committee think that the future would be sufficiently provided for.

I am, &c.,

W. N. SHAW.

The Secretary,
H.M. Treasury,
London, S.W.

METEOROLOGICAL COMMITTEE.

ESTIMATES FOR 1913-14.

MEMORANDUM ON INCREASED CHARGES.

	£	£
1. *Increase of ordinary Office charges incidental to the transfer to new premises and increase of office business*	—	1,412

This sum is made up of increase of Post Office charges, telegrams £510, postage £230, liftman, watchman, engineers, messengers, cleaning, workshop and laboratory, incidental expenses, and stations taken over from the Royal Meteorological Society, £672.

Hitherto part of the increase (£465) has been met by reducing the payment for superannuation, and part (£248) by increases of the appropriations in aid, leaving £899 as the prospective deficit for 1913-14, on the basis of the estimates for 1912-13.

2. *New Office charges for South Kensington.—Salary List:—*

Provision for Secretary and Confidential Clerk	150	
Revision of Salaries of Superintendents	125	
Colonial Observations and Meteorology of the Globe	140	
		415

Secretary and Superintendents.—Appointments to new posts were made provisionally in 1910 for three years. The men were exceptionally young because there was no previous experience to go upon. The appointments lapse in September, 1913. All three have represented that the scale of pay is less than for men of similar standing in corresponding positions elsewhere. It has been made clear to the Committee that to get men of the proper age and standing it is necessary to offer a larger salary for whole time service, and they think that upon re-appointment the scale of salaries should be increased.

Part of the larger cost comes back as increased appropriations in aid, but not all.

Confidential Clerk.—The personal work of the Director has largely increased, partly by the inclusion of the Observatories, partly by the increased public interest in practical Meteorology, and largely by the work of the International Committee and its Commissions. His only personal staff is a Secretary, whose qualifications are primarily scientific. A confidential clerk is now indispensably necessary. To detail one from the present staff of *Correspondence and Accounts* would throw the official correspondence into confusion.

Colonial Observations.—For many years the regular publication of the observations collected by the Office from the smaller Colonies has been promised as a contribution to the Meteorology of the Globe. Every year it has been crowded out, in 1910 by the removal, in 1911 by new stations. Last year a Graduate Assistant at £60 was detailed for the Colonial work, and some arrears were overtaken, and now we must either go on or go back. Every year adds its evidence to prove that the Meteorology of the Globe should be studied as a whole. The fine summer of last year, the abnormal features of the distribution of ice in the Atlantic, and the cold summer of this year, are left without any real chance of explanation until a view of meteorological conditions over the whole Globe can be given. It is proposed, therefore, to go forward, the Graduate Assistant becoming "Assistant Meteorologist" with a boy-clerk to help.

3. *New Office Charges for South Kensington.—Forecast and Storm Warning Service:—*

New Telegraphic Charges	220	
Day and Night Signals	250	
Cases for Display of Information	200	
		670

New Telegraphic Charges.—Certain improvements (some of which have already been pointed out) are necessary in the service of telegraphic reports from the Continent—for morning, to accelerate the work; for the evening, to supply additional information necessary for the reports to newspapers. Our evening information is insufficient for forecasting on a proper basis. A new situation arises from the fact that there is an international movement for evening reports for 6 p.m. G.M.T. in the interests of agriculture, so that for this country the special expense of providing observers (which has hitherto been deterrent) will be avoided.

Russia asks for co-operation in the exchange of telegrams *at reduced prices* with a view to a synchronous chart for the whole Eurasian Continent and adjacent islands at 6 p.m. G.M.T. to begin in 1915. If this request is to be met, the sum provided must be larger.

Storm Warnings: New Day and Night Signals, £250.—A new system of Storm Signals on an international basis has been adopted. It requires two cones at each station instead of one. To supply them will take about £185. With the remainder it is intended to re-introduce night signals in these

countries. It has long been a matter of reproach that there is no provision in this country for storm signals after dark. The question has been left in abeyance for some years, while the organisation of the Forecast Division was being considered. Now that that is in order, the question of storm signals comes up again, and we ought now either to put them on a business-like footing or give them up. The present arrangement whereby the work is half-done cannot be defended.

Cases for the Display of Information, £200.—At present a great deal of the value of the Meteorological Service is lost for want of organisation to enable the public to make use of it. This is especially true with regard to Fishery Barometers and Storm Warnings. The traditional principle is that the local expenditure in connexion with these services must be provided for locally. The principle gives rise to a good deal of criticism, but is in itself a good one. To make it a success a certain number of specimen stations are wanted where the Office can display the information which the localities can procure if they will find the money. In that case local rivalry would tend to make for efficiency instead of neglect. For such stations four frames are required costing 30*s.* each. We ought to equip 30 stations as specimens at a cost of £200.

4. *Observatories: Additional Meteorological Work in connexion with the Daily Weather Service.—Salaries* ... ... — 500

The necessity for a junior staff of trained meteorologists has been dealt with in a letter to the Treasury. It is proposed to provide for it by Assistant Meteorologists in close connexion with the Daily Weather Service at Kew, Valencia, and Eskdalemuir (£375). There is a special reason as regards Valencia. The Superintendent there is old and must retire shortly. There is no one suitably trained to succeed him. To send a man at short notice to the South-west of Ireland is not easy and may give rise to some local difficulty on the ground of patronage unless the matter is taken in hand at the proper time.

The remaining £125 is set down partly for increased salaries at Kew and partly for pilot balloon observations at Falmouth or Scilly and Aberdeen. Pilot balloon observations are a new and important method of studying the structure of the atmosphere. We have now arrived at the stage at which it is necessary to get co-operative results from a number of stations. The investigation from a single station has been pushed by the Branch Office at Farnborough and by the private enterprise of Mr. C. J. P. Cave as far as it can go.

Our own conclusion in that respect is borne out by the experience of other countries which are also convinced of the practical importance of the investigation and the necessity for co-operation. A resolution of the International Commission for Aeronautics which met at Vienna in May, has been forwarded by the War Office inviting the co-operation of this country in a daily pilot balloon observation. The stations in view are Valencia, Aberdeen, Eskdalemuir, Falmouth or Scilly, and a London station (Farnborough or Kew). It is this work which should form a new element in the training of the junior staff; it is suitable for the Observatories, and at the same time it is so closely connected with the daily weather work as to be an invaluable introduction to its practical study.

5. *Observatories.—New general charges* ... ... — 1,071

The additional charges included in this sum are :—

	£
At Kew.—Loss of contribution to salaries and working expenses on the withdrawal of the National Physical Laboratory staff...	225
Mechanic	120
Cost of re-equipment of workshop and re-instatement of Observatory after alterations	250
At Eskdalemuir.—Deficit of working...	126
Revision of Superintendent's salary	100
Seismologist—£200—£300	250
	1,071

The expenses at Kew are incidental to the withdrawal of the National Physical Laboratory Staff and the re-instatement of the institution as an independent Observatory.

As regards Eskdalemuir, the obligations of the Committee as regards the deficit on current account and for the continuance of the salary of a seismologist, have already been pointed out to the Treasury, as well as the necessity for revising the scale of payment of the salary of the Superintendent at the termination of five years' service.

Total £4,068

Meteorological Office,
London, S.W.
6th December, 1912.

1912) Minutes 380-381

380 National Insruance Act (Minute 362) Read - the following letters -

M.O.4,243

National Health Insurance Commission
(England)
Buckingham Gate, London,S.W.
15th November, ~~1910~~ 1912.

Sir,

I am directed by the National Health Insurance Commission (England) to forward for your information a copy of a letter which they have addressed to the National Health Insurance Commission (Dublin) on the subject of the liability to insurance of Meteorological "observers"

I am to express to you the Commissioners' thanks for the assistance which you have rendered them in the matter.

I am, &c.,
JOHN ANDERSON

The Director,
Meteorological Office.

(COPY)

November, 1912

Sir,

With reference to your letter of the 21st ultimo. I am directed by the National Health Insurance Commission (England) to state that from information supplied to them at an interview by the Director of the Meteorological Office, it is clear to them that the Meteorological "observers" employed by that Office are notemployed under a contract of service, and are, therefore, not liable to compulsory insurance.

I am, &c.,

The Secretary,
National Health Insurance Commission (Ireland),
Pembroke House, Upper Mount Street, Dublin.

It was explained that a distinction is drawn between a contract of service which renders the employee subject to compulsory insurance and a contract for specific services which does not constitute "employment' within the meaning of the Act.

381 Directors' Report and Accounts:-

Royal Yacht. A letter of thanks (M.O.4,309) has been received from the Commodore of the Royal Yacht for various weather forecasts and reports sent to the "Victoria and Albert" from time to time during the year and stating that "the information you have sent has been of the greatest assistance".

Ice Scouts:- By invitation of the President of the Board of Trade the Director and Superintendent of the Marine Division have taken part in a Conference with Sir H.Llewellyn Smith as chairman on Ice Observation Vessels arising out of a report of the Advisory Committee on Lane Routes across the Atlantic.

Observers' Calendar:- Opportunity has been taken of the approaching New Year to carry out an intention of some years' standing to amplify the usual calendar of instructions to first order s tations by including instructions as to the dates of international days for upper air research as well as instructions suitable for the different stations, and adding the Greenwich times of sunrise, noon, sunset, and the highest and lowest temperatures recorded in "Temperature Tables" for each of the five observatories, Kew, Aberdeen, Eskdalemuir, Falmouth and Valencia. These will go on an opposite page and, using one opening for each week, the opposite page will give the weekly and seasonal values of Mean Temperature, Rainfall and Sunshine for the eleven districts of the British Isles, and historical notes of conspicuous occurrences, meteorological, magnetic or seismic and some biographical information.

In order to avoid the delay of another year the available material for the first quarter was put together and the copy sent to the Stationery Office a

Stationery Office on 2nd December, and as the information is likely to be of general interest 500 copies were ordered on an S.O.P. requisition although it had not been included in the programme of publications for this year. It is proposed to work overtime in the Statistical Division in order to complete the copy amounting to 108pp 8vo in time to go back to the printers with an approved specimen.

The chief purpose of the calendar is to promote a greater sense of solidarity among the observers of different orders and different subjects.

Approved.

It is also proposed to work overtime in the Statistical Division in order to finish the new set of normals for stations in connection with the office up to 1910. The results form a quinquennial Appendix III to the Weekly Weather Report and the issue is due for the Weekly Weather Report of 1911.

Approved.

Office Staff - Reported - that W.J.Winter, Messenger, died at the Fairlight Sanatorium on 19th November. T.J.Winkworth takes messenger's duty for the present, but new arrangements will be made in the new year.

Reports of Work for November, 1912. 1 Marine Division - Meteorological Tables for the Admiralty - Japan and British Columbia Pilots in course of completion.

33 Meteorological Log Books and 1 Lighthouse Register: also 126 North Atlantic Registers, 62 Radio-telegraphy registers, and 16 Indian Ocean Registers dealt with on receipt.

North Atlantic Meteorological Chart, issue for December, 1912, published; and issue for January, 1913, in course of preparation. Indian Ocean Chart for December 1912, January 1913, published.

Monthly limits of icebergs and field ice in North Atlantic in course of preparation.

Extraction of observations relative to the Yellow Sea - Data extracted from 19 logs.

The estimated cost, at rates ordinarily charges, of work done for Public Offices £22 5s.

2. Forecast Division. (1) Current work has been kept up to date.

(2) Number of wireless messages has been :-
(a) from H.M.Ships, November, none
(b) from ships of Mercantile Marine, November, 493

(3) Corrections to Daily Weather Report for October prepared.
(4) Forecast Checking up to 21st April.
(5) Wind Frequency tables prepared up to middle of July.
(6) Working Charts prepared for binding up to middle of August.
(7) Inquiries:-

Prepaid Replies	8
Other Telegraphic Inquiries	3
Wireless Inquiries	-
Telephone Inquiries	12
Personal Inquiries	-

(8) Information was supplied regularly from 23rd October to 15th November to the Air Craft Factory, South Farnborough, in connection with the experimental forecast service carried on there during this period.

Storm Warnings in October, 1912 - The return of the telegrams from the signal stations has enabled us to test the working of the new classified service for ~~distinction~~ distribution introduced by the Post Office on 1st October.

Total number of telegrams accounted for	1,521
Cone hoisted within two hours or first thing next morning in the case of evening telegrams, the telegrams being delivered the same evening	1,362
No. of evening telegrams	604
Delay of more than three hours in hoisting	23
Delay of more than two but less than three hours	75
Telegrams mislaid by custodians and not returned	61

Of the twenty three occasions on which the cones were not hoisted until more than three hours after the issue of the warning, five appear to be due to delay on the part of the Post Office; six were cases of delay on the part of custodians; on the remaining twelve occasions there were telegraphic interruptions.

There have been a few cases of miscarriage or duplication of telegrams. In some instances telegraph clerks had failed to appreciate that the new service supersedes the old system of working through distributing centres.

The warnings issued on 20th October failed to reach the north-western district of Scotland while on the 26th instructions to to hoist reached the north-east of Scotland, though no notice had been issued from the Meteorological Office. These irregularities have been reported to the Post Office with a view to avoiding the repetition of such errors.

Action has been taken about the five cases of apparently unnecessary delay referred to above.

3. Statistical and Library Division. British Meteorological and Magnetic Year Book, 1912. Parts I and II up to date. Part III, Section 1, up to date; part III, section 2, March ready for press. Part IV section I; Values for Valencia (February, March), Kew (March), Eskdalemuir (January to March) sent for press. Copy for May and June fo for Valencia, Kew and Eskdalemuir sent to printer. Part IV, sections (1) and (2), volumes for 1911 completed and passed for issue.

The examination of the Observatory records and sunshine cards the tabulation of cup anemograms, and the summaries of pressure tube anemograms, have been kept up to date.

Library: 47 author cards and 100 subject cards prepared for Catalogue.
Inquiries as follows ° Newspapers 3, Legal, 15, Scientific and Commercial, 39, Forecasts, nil, General 4. The receipts in connection with these amounted to £5 18 2d.

4. Instruments Division - Admiralty Work - Supplies have been sent to six dockyards to meet the deficiencies shown in the quarterly returns.

Marine Work - Instruments have been sent to our Liverpool Agent and have been supplied directly to seven ships, one lightship and two coastguard stations: new storm cones have been sent to three ports.

Private Requisitions - Instruments have been supplied to eight local authorities andprivate individuals, a set of climatological instruments for Lord Anglesey's station at Beau Desert being the largest order.

Colonial Requisitions - Requisitions from Gibraltar, N. Nigeria and S. Nigeria received through Crown Agents have been completed. Eight Colonial orders are now in hand.

Upper Air - One meteorograph box has been sent to Ireland.

Observatories - A new nephoscope glass has been sent to Valencia, and an ivory scale to Kew.

Exhibition - An aviation exhibition is to be held at the Science Museum, S. Kensington - The meteorological part of the exhibition is being arranged by the Meteorological Office.

Absolute Units - Two barometers graduated in absolute units have been ordered. The name baromil has been adopted provisionally for the length of the mercury column which gives a pressure one millibar in latitude 45° at the standard temperature 273°A.

Publications.—Report for November from Clerk of Publications :—

—	November.	
	Received.	Issued.
Daily Weather Report	800	788
Weekly Weather Report	375	323
Monthly Weather Report, &c.	575 (Oct.)	435
Do. do. (Maps)	25 (Oct.)	2
Daily Readings	100 (Sept.)	48
Geophysical Journal	—	—
Hourly Values.—Meteorological.—Kew	—	9 (Jan. and Feb.)
Eskdale ...	300 (Jan. and Feb.)	do.
Valencia ...	300 (March)	do.
Do. —Geophysical.—1911	375	21
Monthly Meteorological Charts (Atlantic)	600 monthly to Dec. (3)	549
Monthly Meteorological Charts (Indian)	350 (Jan.)	301
Barometer Manual (7th edition)	250	—
International Upper Air Observations	—	—
Seventh Annual Report	—	8
Observer's Handbook (1911)	—	7
"Forecasting Weather"	—	1
Geophysical Memoirs, No. 1	—	6
No. 2	—	2
No. 3	—	1
No. 4	—	1

Receipts from sales at M.O.—November, £2 2*s.* 8*d.*

New Publications.—Barometer Manual : The seventh edition is published, and 250 copies have been received. Hourly Values—Geophysical Section : The volume is now published.

A Calendar for 1913, with Notes and Diary of Operations, for the use of Observers, is in preparation.

M.O. Press.—During the month ended 30th November, 1912, the issue of the Periodical Publications has been as follows :—Daily Weather Report, maps for the Weekly Weather Report, maps for the Monthly Weather Report, Monthly Meteorological Charts, North Atlantic, Monthly Meteorological Charts, Indian Ocean.—As contract.

On 1st November, 1912, there were four requisitions for forms, diagrams, &c., outstanding. Since that date one requisition has been discharged, leaving three requisitions still in hand.

200 additional copies of the Daily Weather Report have been printed during the month in compliance with requests received from Educational Authorities.

Branch Office.—Mr. J. S. Dines's Report for October and November, 1912.—I spent four weeks at South Farnborough during which time 63 balloons were sent up and followed, mostly with two theodolites. The working out of the wind velocities from these observations was kept practically up to date. 17 weather charts were also prepared based on telegraphic information received through the Meteorological Office. I was helped in the work at Farnborough by Mr. G. Dobson of Kew Observatory.

I visited the Royal Central Flying School at Upavon and the Royal Aircraft Factory at South Farnborough in company with the Director of the Meteorological Office on the 3rd and 4th October.

I have prepared a description and photographs of the wind direction recorder in use for the Advisory Committee at Pyrton Hill.

A quick-run apparatus to give a time scale of about 2 inches per minute on the anemograph has been completed.

Some records have been obtained from this apparatus on special occasions.

Wise has helped with the observational work at Farnborough and Pyrton Hill and devoted the remainder of his time to work for the Meteorological Office.

Observatories.—Reports of Work for November.—Kew.—The barograph, thermograph and anemograph (Robinson Cup) curves have been tabulated as usual and the ordinary meteorological data have been sent weekly to the office.

The following absolute observations have been made :—

Magnetic	Declination	4	
	Inclination	4	
	Horizontal Force	4	
Potential Gradient on		19	days.
Wilson Apparatus		10	„
Ebert „		4	„
Pyrheliometer		3	„

International Cloud observations were made on three days.

Two scale value determinations were made of the new Dines Pressure Tube—the position of whose index pointer has been altered by Mr. Munro—and the results communicated to the Meteorological Office.

A scale value determination has also been made of the seismograph.

The electrograph battery has been cleaned and replenished. Photographic paper has been supplied to Eskdalemuir Observatory and the India Office.

The discussion of the observations made with marine barometers has been concluded and handed to the Director.

Mr. Corrin was away on sick leave three weeks—returned and was again taken ill.

Eskdalemuir.—Buildings.—Workmen have been engaged in making a trench in the concrete in the magnet house since Wednesday, November 20th. They are not finished yet.

Staff.—Mr. Dines arrived on 2nd November.

Meteorology.—The normal observations and tabulations have been made.

Magnetism.—The normal work has proceeded but the presence of workmen has vitiated several records, more especially the V records. The V records generally are becoming so troublesome that it is doubtful if the tabulated readings are of any real value.

Seismology.—The records have been somewhat unsatisfactory owing to the defective manipulation of the apparatus. Fortunately no damage has yet been done to the Horizontal Galitzine seismographs.

Solar Radiation and Ionisation.—No observations have been made.

Accounts.—Submitted—the following statement :—

	£	*s.*	*d.*
Bank balance on 31st October, 1912	3,556	8	2
Receipts from 1st to 30th November, 1912	901	4	6
	4,457	12	8
Cheques drawn from 1st to 30th November, 1912	1,709	3	6
Bank balance on 30th November, 1912	£2,748	9	2

FORTY-SEVENTH MEETING.

South Kensington, London, S.W., 12th March, 1913.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	CAPTAIN LYONS.
CAPTAIN HARVEY.	MR. MIDDLETON.
THE HYDROGRAPHER.	DR. SCHUSTER.

382. The Minutes (376–381) of the last Meeting (4th December, 1912) were read and confirmed.

383. METEOROLOGICAL COMMITTEE.—Reported—that Sir G. H. Darwin, K.C.B., F.R.S., a member of the Committee from its foundation, on the nomination of the Royal Society and previously a member of the Meteorological Council from February, 1885, when he succeeded the late Mr. Warren de la Rue, died at his residence, Newnham Grange, Cambridge, on Saturday, 7th December, 1912.

A letter from the Treasury (25047/12) was received on 28th December, 1912, expressing to the Meteorological Committee Their Lordship's great regret at the heavy loss which the meteorological service of the country has sustained by Sir George Darwin's death.

The Director was authorised to write a letter of condolence to Lady Darwin on behalf of the Committee.

Reported further—the following Treasury Minute of 26th February, 1913, appointing Captain H. G. Lyons, F.R.S., to fill the vacancy on the Committee :—

Treasury Minute dated 26th February, 1913.

My Lords read again Treasury Minute of the 20th May, 1905, respecting the constitution of the Meteorological Committee.

They have before Them a letter from the Royal Society nominating Captain H. G. Lyons, F.R.S., to the seat on the Committee which has become vacant owing to the lamented death of Sir George Darwin.

My Lords are accordingly pleased to appoint Captain Lyons as a member of the Committee for a period not exceeding five years.

Captain H. G. Lyons attended and took his seat as a member of the Committee.

384. ESTIMATES FOR 1913–14 (Minute 379).—Read the following letter from the Treasury (M.O. 933) also a memorandum by the Director dated 28th February, 1913 :—

Treasury Chambers,
25th February, 1913.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letter of the 6th December last with enclosure respecting the estimate of the expenses of the Meteorological Office for the year 1913/14.

In reply I am to say that My Lords, having given careful consideration to the representations contained therein, are satisfied that it would be desirable to increase the grant in aid and They are accordingly proposing to ask Parliament to Vote an inclusive sum of £20,000 in 1913–14 and subsequent years for this service.

My Lords trust that this enlarged provision will prove to be sufficient for the future to meet subsequent developments of the meteorological service. They direct me to state that, as so much of the expenditure of the Office is of a recurrent nature, it would appear desirable not to expend forthwith up to the increased total of the grant, in order to provide a margin for necessary developments.

My Lords are in communication with the Royal Society on the subject of the grant in aid for Eskdalemuir Observatory, which will for the year 1913/14 continue to be made to the Royal Society.

I am to take this opportunity of transmitting the enclosed copy of correspondence with the Scottish Office relative to the application of the Scottish Meteorological Society for additional funds.

I am to request that you will confer, as suggested, with representatives of the Society, and will consider whether from the increased grant placed at the disposal of the Meteorological Committee you could not find the funds necessary to place the finances of the Society on a satisfactory footing and arrange for a closer co-operation between the work of the Society and that of the Meteorological Office.

I am, &c.
ROBERT CHALMERS.

The Director,
Meteorological Office.

CORRESPONDENCE.

I.—*Scottish Meteorological Society to Registrar-General for Scotland.* [*Not enclosed with Treasury letter.*]

Scottish Meteorological Society,
122, George Street,
Edinburgh,
7th March, 1912.

SIR,

THE Council of the Society have had under consideration the finances of the Society and its future position, and now have to state that they fear that they will be unable to supply you much longer with the meteorological reports which are published along with your Returns unless the annual grant received for preparing these reports is greatly increased.

It may be recalled that there have been three distinct stages in the connection between the Society and your Department. The Society was founded in 1855, and Dr. Stark was its first Secretary. He was also Superintendent of Statistics in the Register House and himself prepared the meteorological reports required for your Returns. In 1858 a Secretary was appointed who should give his whole time to the work of the Society, and an application was made for a Government grant. That application was unsuccessful, but the justice of the Society's claims was so far recognised that an arrangement was come to by which the heavy computing work involved in the reports and their actual preparation should be undertaken by the Astronomer Royal for Scotland. This somewhat awkward arrangement continued until 1893 when the entire work connected with the reports was left in the hands of the Society, and since that date the Society has received an allowance of £100 a year in consideration of that work.

The Society has therefore had an extended experience of the present arrangement, and the Council have come to the conclusion that it is unsatisfactory. The grant of £100 per annum has never represented more than a part of the cost of collecting the necessary material and preparing the reports, the greater part of the cost having always been a charge on the general funds of the Society. It is a matter of gratification to the Society that reports prepared by them are accepted and published by your Department, but the Council cannot take the view that this should be a factor in determining the financial arrangement between your Department and themselves.

The Council can no longer delay bringing the matter before your attention because the present position of the Society is causing them grave anxiety owing to the fact that there has been a serious shrinkage in that part of the income of the Society which is derived from the subscriptions of members, and because the Council find it impossible to make good this shrinkage. No part of the income derived from subscriptions should be diverted from its primary purposes of giving encouragement and direction to Scientific Research and of meeting the cost of preparing and publishing research papers and papers of educational value, especially as at the present time many new avenues for meteorological research are being opened out.

The Council submit that the extra cost of supplying reports to a Government Department should be met out of public funds.

For your information the Council beg to state that the total income of the Society during the last few years has averaged about £500. In addition to the allowance of £100 for the reports furnished to your Department, they have received a year-to-year payment of £95 from the Meteorological Office for work done; the rest of the income has been derived from voluntary sources.

In the opinion of the Council an annual expenditure of £300 is necessary if they are to continue to supply meteorological reports as at present, and they therefore beg respectfully to make application through your Department for an annual grant of that amount, instead of the present grant of £100.

I am, &c.,

ALEX. CRUM BROWN,
President.

The Registrar-General for Scotland,
H.M. Register House, Edinburgh.

II.—*From Registrar-General to Scottish Office.*

General Registry Office of Births, &c.,
New Register House,
Edinburgh,
12th April, 1912.

SIR,

I ENCLOSE herewith, for the information and consideration of the Secretary for Scotland, a letter which I have received from the Scottish Meteorological Society, from which it appears that the Society finds itself in the position of being no longer able to supply the Meteorological Reports which have been furnished to this Department for a long period of years and which are of essential value to our reports on vital statistics. We now receive from the Meteorological Society (1) weekly returns from eight cities in Scotland, (2) monthly reports from the same eight cities, and (3) quarterly reports from seventy-five stations in Scotland which are furnished with the materials and supply data relating to the weather conditions in each.

The letter of which I enclose a copy explains the history and position of the Society. It has been entirely supported by voluntary subscriptions over and above the grant of £100 which it has received in consideration of the work it has done in connection with our reports to which I have referred above. But, as will be observed, the grant of £100 has fallen very far short of the cost of collecting the necessary material and it has always been supplemented out of the general funds of the Society. It is stated in the letter "there has been a serious shrinkage in that part of the income of the Society which is derived from the subscriptions of members," and it seems clear that, if the Meteorological Reports are to continue to be supplied as at present, a further grant from the Treasury will be required for that purpose.

I may refer (1) to a letter written by my predecessor (dated 9th June, 1882) to the Treasury, of which I enclose a copy—following on which the present arrangement which exists between this Department and the Meteorological Society was made—and (2) to the accompanying file containing the correspondence between the Registrar-General and the Treasury at that time, and (3) to an article by Mr. Andrew Watt, the present able Secretary to the Meteorological Society, entitled "The Early Days of the Society," from all of which it will, I think, be clear to the Secretary for Scotland that the Society has performed a great public service at a cost to the nation which is infinitesimal, but which —gauged by the demands that have been made upon and responded to by the charitable public—has been very considerable. I trust, therefore, that the Secretary for Scotland may see fit to press the claims of the Society upon the Treasury for the further grant that is asked; particularly in view of the fact that public health statistics are becoming more and more important in their bearing upon the social conditions of the population, and are incomplete without a reasonably full statement of existing meteorological conditions.

In this connection I cannot avoid alluding to a question which I see was addressed to the Secretary to the Treasury recently, enquiring whether an extra grant can be given to the Meteorological Office—that is, the English Meteorological Office—in order to extend and add to the number of centres in Scotland from which Meteorological data are supplied. If it be conceded that a grant is justified in the case of the English Meteorological Office for work done in Scotland, it would appear not unreasonable that the Scottish Meteorological Society should receive at least an equivalent. The existence of the Scottish Meteorological Society was possibly overlooked on the occasion.

I am, &c.,

J. PATTEN MACDOUGALL,
Registrar-General.

The Under Secretary for Scotland,
Scottish Office,
Whitehall, London, S.W.

III.—*Form Scottish Office to H.M. Treasury.*

Scottish Office,
Whitehall, S.W.,
8th May, 1912.

SIR,

I AM directed by the Secretary for Scotland to transmit to you, to be laid before the Lords Commissioners of His Majesty's Treasury, the accompanying copy of a letter, dated 12th ultimo, from the Registrar-General for Scotland, covering an application from the Scottish Meteorological Society (of which a copy is also forwarded, with a further relative enclosure) for an increase by

£200 of the annual Government Grant of £100 which the Society presently receive in consideration of the Meteorological Reports which they furnish to the Registrar-General. It will be seen from Mr. Patten MacDougall's letter that he considers these Reports to be of essential value to the vital statistics issued by his Department, and it seems to the Secretary for Scotland (who strongly concurs in the Registrar-General's opinion) to be most desirable that provision should be made to the Society from public money to enable them to continue this very useful work, which is now in danger of lapsing for the reasons stated in their application. I am accordingly to suggest to Their Lordships' very favourable consideration that authority be granted for increasing the Society's annual Grant by the amount desired.

I am, &c.,
JOHN LAMB.

The Secretary to the Treasury.

IV.—*From H.M. Treasury to Scottish Office.*

Treasury Chambers,
1st November, 1912.

SIR,

THE Lords Commissioners of His Majestry's Treasury have carefully considered Mr. Lamb's letters of the 8th May and 19th June last (23351/1 and 23351/3) respecting an application from the Scottish Meteorological Society for an increase by £200 in the grant for the supply of Reports to the Registrar-General for Scotland.

In addition to the £100 a year which they already receive for this service, the Scottish Meteorological Society receives about £150 a year through the Meteorological Office, of which £100 is in consideration of copies of meteorological returns supplied to that Office to be incorporated in the climatological reports and £50 is a retaining fee to Mr. Watt, Secretary to the Society, as an Inspector of Stations to the Office. The addition of £200 a year would bring up the total sum contributed by Government to the Society to nearly £450 a year.

My Lords think that the grant by Government of so large a proportion of the Society's annual expenditure could only be justified if steps are taken to bring the work of the Society into much closer co-operation with that of the Meteorological Committee, which is the Government authority for meteorology throughout the United Kingdom, than that which now obtains.

I am to point out that the Quarterly Report of the Registrar-General in this country has in recent months been reduced by the omission of the meteorological information formerly contained therein, as all the necessary meteorological data are published in the statistical publications of the Meteorological Office. It would appear desirable that the question whether a similar action should not now be taken as regards Scotland should be considered.

I am therefore to suggest that the Scottish Meteorological Society may be requested by the Secretary for Scotland to place itself in communication with the Meteorological Office in order that, if it so desires, a scheme of readjustment of the activities of the Society and of the Office may be prepared.

I am, &c.,
T. L. HEATH.

The Under Secretary,
Scottish Office.

V.—*From Scottish Office to H.M. Treasury, forwarding copy of a Minute by the Registrar-General.*

Scottish Office,
Whitehall, S.W.,
10th December, 1912.

SIR,

WITH reference to your letter of 1st ultimo on a proposed increase of the Government grant to the Scottish Meteorological Society, I am directed by the Secretary for Scotland to transmit for the information of the Lords Commissioners of His Majesty's Treasury the accompanying copy of a minute by the Registrar-General for Scotland on the meteorological statistics contained in the Quarterly Return of Marriages, Births, and Deaths. I am to add that the Secretary for Scotland is communicating with the Society, with a view to obtaining their observations on Their Lordships' suggestions.

I am, &c.,
JAMES M. DODDS.

The Secretary to the Treasury.

Copy of Minute by Registrar-General for Scotland dated 18/11/12.

My first observation is that, turning to the last published English Quarterly Return of Marriages, Births, and Deaths, I find that it contains two and a half pages (ix., x., and xi.) of meteorological information furnished by the Meteorological Office; although it is true that the Meteorological Tables formerly supplied in that Return now seem to be omitted. It also contains quarterly means of temperature and rainfall for a number of the great towns (pages 8–11 of the same Report). The reason given by the English Registrar-General for the omission of the Table is, as stated on page 11 of the Quarterly Return, No. 253, that "the meteorological section of the Return has been suppressed because it has been of recent years a mere copy in a slightly condensed form of the Monthly Weather Report of the Meteorological Office." But no such reason applies in Scotland. Our meteorological statistics, contained in the Quarterly Return, are especially prepared for our purpose, and, although it is true that the English Meteorological Office does obtain some weather returns from Scotland, the stations with which it deals are comparatively few, although they include a portion of the seventy-five dealt with in our Reports. Their comments on these returns sometimes show little knowledge of the geography and conditions of Scotland.

The value of these weather conditions as bearing on vital and health statistics is universally acknowledged. Certain weather conditions materially influence death rates, and data relating to the latter would be very incomplete without a record of the weather conditions applicable thereto.

VI.—*From Scottish Office to H.M. Treasury, forwarding copy of a letter from the Scottish Meteorological Society.*

Scottish Office,
Whitehall, S.W.,
15th January, 1913.

SIR,

IN continuation of the letter from this Office of 10th ultimo and previous correspondence on the application for an increased grant by the Scottish Meteorological Society I am directed by the Secretary for Scotland to transmit, to be laid before the Lords Commissioners of His Majesty's Treasury, the accompanying copy of a letter from the Society, dated 10th instant, which deals with the points raised in your letter of 1st November last (12510/12). In view of the Society's statement that they would welcome consideration of a scheme of co-operation with the Meteorological Committee, Mr. McKinnon Wood hopes that Their Lordships will now be pleased to give their consent to the increase of the grant by £200.

I am, &c.,
JAMES M. DODDS.

The Secretary to the Treasury.

Scottish Meteorological Society,
122, George Street,
Edinburgh,
10th January, 1913.

SIR,

YOUR letter (233351/5) of the 10th ult. has already been acknowledged. I have now had the opportunity of laying before the Council of the Society that letter and the copy of your letter of 1st November, 1912, from the Lords of the Treasury, and I am instructed to submit to my Lords through you the following observations :—

(1) The increased grant is required in order to furnish the reports which are supplied to and published by the Registrar-General for Scotland. A careful consideration of the work done leads the Council to say that the amount asked for is a moderate one.

(2) The publication of the reports by the Registrar-General for Scotland is the only way in which all the information contained in these reports is made available. While it is the case that the quarterly report of the Registrar-General in England has been reduced by the omission of meteorological information, the Council understand that the information formerly given consisted of extracts from reports published by the Meteorological Office and that the continuance of such information in the Registrar-General's Reports would have implied merely duplication of what was otherwise available to the public. It would appear, however, that if the reports furnished by this Society ceased to be published a substantial and material portion of the information they contain would not be available to the public. That the similar information for England is made available through the publications of the Meteorological Office shows that it is desirable from a public point of view that such information should be made available.

(3) I am desired to add that the Council will welcome consideration of a scheme of re-adjustment of the activities of the Society in relation to the Meteorological Office, as is suggested by the Treasury. The Council are of opinion that a meeting between representatives of the Meteorological Office and the Society would serve to develop the suggestion of the Treasury in a useful manner.

(4) In the meantime it is respectfully pointed out that the work for which the additional grant is asked, is not only of Scottish but of national importance; that there is no overlapping of work with consequent useless expenditure; and that the work in respect of which application for an additional grant has been made is done at a moderate cost. It is therefore hoped that the Treasury will not hesitate to make the desired provision in the forthcoming estimates.

I am, &c.,
J. MACKAY BERNARD,
President.

The Director brought up a revised list of salaries (D 384) showing a total of £11,910 as provision for the coming year for work already sanctioned.

The Director was authorised on behalf of the Committee to confer with the Scottish Meteorological Society, as requested by the Treasury, with a view to placing the finances of the Society on a satisfactory footing as regards the work done for the supply of information to the public, on the understanding that the total charge upon the Office grant for the work under consideration should not exceed £350; being an increase of £200 on the sum already provided in the estimates for the Scottish Society and for the Secretary on account of inspections.

The following items additional to those in the revised salary list (D. 384) and to those in Schedule II. of the detailed estimates of Minute 379 were approved :—

SALARIES :	£	£
Provision reserved for readjustment of salaries of Superintendents and Secretary upon consideration of re-appointment for 1st October, 1913 (per annum)		125

		£	£
Office Staff:	Clerk, Boy Clerk, and Messenger...	151	
	Professional assistant for the Meteorology of the Dominions and of the Globe (in place of Graduate Assistantship transferred to the Forecast Division)	100	
	Allowance for revision	8	
	Total Increase for Office Salaries		384
Kew Observatory:	Professional Assistant	125	
Eskdale Observatory:	Probationer (in addition to provision already made in Schedule I. for replacing the grant of £200 a year from the Royal Society which lapses in September, 1913)	36	
	Allowance for revision	3	
	Total Increase for Observatory Salaries ...		164
Allowance to augment the funds of the Scottish Society			200
Expenditure other than Salaries :			
	Post Office—for improvement of the service from Holland, Belgium, and Spain	100	
	Superannuation fund (in addition to £209 paid out of revenue as pensions for staff clerks)	352	
	Cost of instruments	150	
			602
	Total increase		£1,350

The death of Mr. C. H. Thompson (Minute 390) reduces the charge of operative pensions by £77.

These changes involve the following alterations in the estimates of Minute 379, the italic figures being omitted :—

Salaries :	Office	£9,115 instead of	£8,711
	Observatories	3,343 „	3,478
Telegrams...	... ...	3,040 „	2,940
Superannuation	allowances (operative) ...	1,496 „	1,573
	fund	352 „	—
Grants for salaries, &c. in Edinburgh ...		350 „	150
Grants, &c. to auxiliary observatories, &c.		2,116 „	2,081
Instruments	... ...	2,460 „	2,310

On the side of the Appropriations in Aid the subventions for M.O. observatories have to be increased by £1,000 for Eskdale Observatory to be paid by the Royal Society, so that the total becomes £6,850.

No change was made in the distribution of the funds on account of the intimation of the Secretary of the Falmouth Observatory Committee that there was no alternative but to close the Observatory on 30th June. In case that event should happen the appointment of a meteorologist not specially attached to any observatory or station but available for work of special character at any of them was approved.

With these alterations indicated in the foregoing the final draft of the estimates for 1913–14 becomes as follows :—

METEOROLOGICAL OFFICE.

REVISED ESTIMATES for the Year 1913–14.

Heads of Service.	Proposed for 1913–14.	Voted for 1912–13.	1913–14. Increase.	1913–14. Decrease.
				£
Director	1,000	1,000	—	
Salaries: Office	9,115	8,776	339	—
Observatories	3,343	3,336	7	—
Expenses of office:				
Rent, fuel and lighting	735	730	5	—
Repairs, furniture, and incidental expenses	470	405	65	—
Postage	660	650	10	—
Telegrams	3,040	2,475	565	—
Travelling expenses	400	340	60	—
Superannuation allowances (operative) ...	1,496	1,383	113	—
„ fund	352	—	352	—
Cost of instruments	2,460	2,310	150	—
Expenses of M.O. observatories	1,313	1,045	268	—
Grants, &c. to auxiliary observatories, anemograph stations, &c.	2,116	2,081	35	—
Grant for salaries, &c. of Edinburgh Office ...	350	150	200	—
Totals	26,850	24,681	2,169	—
Appropriations in aid:				
M.O. observatories: Subventions	1,462	2,380	—	697
„ Local expenses refunded	221			
„ Office expenses refunded	90	48	42	—
Departmental expenses refunded	455	435	20	—
Incidental expenses refunded	515	495	20	—
Telegraph expenses refunded	600	560	40	—
Inspections	160	—	160	—
Cost of instruments (Navy)	510	510	—	—
„ „ (other sources)... ...	1,500	1,500	—	—
Superannuation	887	800	87	—
Lectures and experiments	450	400	50	—
From balance in hand	—	553	—	553
Totals	6,850	7,681	419	1,250
Parliamentary Grant	20,000	17,000	—	—

A draft letter to the Treasury on the financial position of the Office in the circumstances resulting from the increase of the grant to £20,000 was submitted and approved.

385. Meteorological Office Observatories ♀ Kew - Reported - that information had been received from the Office of Works of the promotion of a Bill in Parliament for additional powers by the London and South Western Railway Company, which requires the assent of the Office of Works, and of the intention of the Company under there existing powers to electrify the line running along the southern boundary of the Old Deer Park, and that notification had been sent round to the Superintendents of the Observatories, the members of the Committee and others asking for suggestions as to safeguards that ought reasonably to be provided in the interest of the Observatory.

It transpired that the effect of the electrification was being cohsidered by the National Physical Laboratory in view of the probable serious disturbance of sensitive galvanometers, and that some form of protection would be sought for that institution to preserve its facilities for testing instruments.

Specimens of records of earth currents and other effects of the electric power plant as used on the existing tramways were submitted in a letter from Dr. Harker, pointing out that with the further electrification contemplated by the London and South Western Railway Company of the line on the north side, the Old Deer Park would be closely surrounded by electric traction circuits.

It was agreed that the compromise of 1899 prevented the Committee from raising objection to the electrification of a line near the Park on the ground of the disturbance that might thereby be caused in the working of magnetic instruments and no cause of objection on other ground was reported.

Reported ♀ the following draft regulations for the working of the Observatory upon the withdrawal of the staff of the National Physical Laboratory.

KEW OBSERVATORY.

On and after 1st April, 1913 the provision for the work of the Kew Observatory will be as follows:-

The ordinary salaries will provide for all the ordinary work of the Observatory, with the exception of Sundays, Christmas Day and Good Friday. Overtime will be paid for the necessary hours of attendance on these days at double rates; and, by special arrangement, for work undertaken by the Observatory on repayment, at "time and a half"; but no overtime payments will be made for holidays.

The ordinary salaries will provide for eight hours' attendance per day, with one half-day holiday per week, to be taken by the several members of the staff as arranged by the Superintendent. Those members of the staff who can be spared will take the half-holiday on Saturdays and the public holidays on fixed days; the others will have days allowed at other times. The other holidays are as set out in the Meteorological Office Circular 002.

The hours of attendance of the several members of the staff will be arranged by the Superintendent to meet the needs of the work of the Observatory. The ordinary work ofthe Observatory includes the observations at 7 a.m.,6 p.m., and 9 p.m. and the necessary telephonic reports to the Meteorological Office; attendance on magnetographs, meteorological, electrical and seismological instruments, and any other observations appropriate to a physical observatory; together with the tabulation, preparation for publication, and discussion of results.

A dinner hour is allowed at times approved by the Superintendents, and a breakfast hour to the member of the staff on duty for the 7 a.m. observations.

The staff of the Observatory, subject to these rules, will be:-

A resident observer.
2 Assistants.
2 Probationers.

It will be the duty of the resident observer to keep the weather book for the hours outside the usual hours of attendance

attendance at the Observatory .

Until further order:
the resident observer will be graded as Professional Assistant on the Meteorological Office staff, and eligible for promotion to Meteorologist, Magentician, or Seismologist.
the assistants will be graded in the second class of clerkships on the Meteorological Office Staff.

The resident observer and assistants nay be required to take temporary duty at any of the establishments of the Meteorolgical Office, without additional payment. While employed on this duty they will be provided with lodging or an allowance in lieu thereof, and out-of-pocket travelling expenses will be allowed.

The rules will come into regular operation on the completion of the alterations at the Observatory by the Office of Works, and, in the meantime, the Superintendent will make such temporary arrangements as may be necessary for carrying on the work.

The tabulations of the curves is to be kept "up to date". For the meteorological and electrical and seismological curves for which the scales values and base values can be determined as soon as the sheets are dry "up to date" is to be understood to mean that the curves up to Saturday or Monday are to be tabulated by the following Saturday For the magnetic curves, until the selection of curves to be tabulated and the scale and base values can be determined at the time, "up to date is to be interpreted to mean:

(1) as regards the provisional tabulation for the Geophysical Journal, within one week of taking off the curves.
(2) as regards the final tabulation, one year later.

12th March, 1913

KEW OBSERVATORY.

From April, 1913, the whole of the regular work of the Observatory will be distributed between the members of the staff, and the salaries as then arranged will be held to include provision for the efficient work of the Observatory, including any attendances necessary outside the usual Office hours.

The usual work outside office hours consists of:-

(1) The weather log i.e. a general watch of the weather, and the noting, sketching, and if possible, the photography of any exceptional atmospheric, celestial or terrestrial phenomena that mayhave a bearing upon meteorology, terrestrial magnetism or seismology.
(2) The observation at 7 a.m. for the Daily Weather Report
(3) The observation at 9 p.m.
(4) The Sunday observations for the Daily Weather Report, together with attendance on the magnetic instruments on Sundays.

But any other work, which, on occasions though unforeseen, proves to be desirable for the efficiency of the ~~Service~~ Observatory, must be taken up without special orders being given. The ordinary salaries are intend to cover such emergencies.

Hours of Attendance - Eight hours a day (inclusive of a dinner hour) will be counted as ordinary attendance, and may be either

7 am to 3 pm (early attendance)
9 am to 5 pm (ordinary attendance)
10.15 am to the transmission of the evening message.

as may be ordered. The members of the staff will, as a rule, take duty in turn. Saturdayafternoon from 1 p.m. will be a holiday unless there is urgent observational work which requires continual attendance.

A room will be provided in the Observatory for a resident observer who will, as far as is practicable, keep the "weather log" for the hours between 6.15 p.m and 7 a.m.

After

After the 9 p.m observation he may go to bed, but he will be expected to get up and do what can be done in the way of observation on the occasion of thunderstorms, or other disturbing occurrences and also in the case of halo, aurora, which he may notice..

The ordinary Staff of the Observatory will be:-

One professional assistant (Graduate) £125
One clerical & technical assistant £175 to £200
One clerical & technical assistant £125 to £150
Two boy clerks or supernumerary clerks
Caretaker, who can act from time to time, if necessary as deputy observer for the 10 p.m. and 7 a.m. observations

The members of the staff may at any time be employed temporarily or permanently at the Office or at one of the other Observatories at the same salaries.

In the case of employment at the Office travelling expenses cannot be allowed, but in the case of temporary employment at one of the other Observatories an allowance will be made for travelling expenses there and back.

12th March, 1913.

ESKDALE - Appointment of Superintendent (Minute 378) Submitted - the following regulations for the office of superintendent prepared by a sub-committee of the Gassiot Committee, consisting of Dr. Glazebrook Captain Lyons, Sr. Schuster, with the Director:-

Meteorological Office
Observatories.

The Meteorological Committee are prepared to appoint, on the nomination of the Gassiot Committee of the Royal Society, a Superintendent of the Eskdalemuir Observatory, in accordance with the following regulations:-

Appointment of Superintendent of Eskdale Observatory.

1. The Staff and admistration of Eskdale Observatory are under the control of the Director of the Meteorological Office, subject to the regulations laid down from time to time by the Meteorological Committee
The official work of the Observatory is:-
i. To maintain a continuous and undisturbed record of the Terrestrial Magnetic elements, to make the necessary observations for expressing the curve readings in absolute measure, to make hourly tabulations with the necessary reductions, and to prepare the tabulations for publication.

ii. (To maintain a Telegraphic Reporting Station for the Meteorological Office)

iii. Subject to the requiremements of the official work above mentioned to maintain a Meteorological station of the First Order, to carry out regular observations in Atmospheric Electricity and Solar Radiation, to maintain and discuss continuous records of seismological disturbances and to carry out auxiliary observations and researches in the physics of the air and the earth, especially those which are related to Terrestrial Magnetism, Seismology and Meteorology.

2. The scientific work of the Observatory is under the general control of the Director of the Meteorological Office, advised by the Gassiot Committee. The magnetic work is carried on in conjunction with that at Kew Observatory.

3. All members of the Observatory staff are appointed by, and are subj subject to dismissal by, the Director, acting on behalf of the Meteorological Committee, in accordance with Treasury minutes of 20th May, 1905 and 31st March, 1910.

4/

4. The monthly salaries of the Staff will be paid directly from the Meteorological Office, but weekly salaries and other disbursements will be payable by the Superintendent out of funds provided by the Meteorological Committee.

5. The buildings provided by the Government include house accommodation for the Superintendent designed originally to provide two sitting-rooms, four bed-rooms and the usual offices. A wing of the upper floor, comprising a sitting-room and two bed-rooms was designed for the accommodation of official visitors, and has been supplied with furniture for that purpose. Repairs, rates and taxes are paid out of the Observatory funds. Rent at the rate of £50 per annum for the accommodation provided is made a charge upon the salary of the Superintendent. In the absence of the Superintendent the accommodation provided for him will be at the disposal of the Director for the use of a deputy, or a visitor engaged upon research a payment being made to the Superintendent at the rate of £2 2s a week for its use, subject to an arrangement about the dilapidation of furniture.

6. The duties of the Superintendent are as follows:-

i. To carry on the work of the Observatory established by Government at Eskdalemuir, in accordance with the general regulations laid down by the Meteorological Committee and the Standing Orders of the Director of the Meteorological Office, with the assistance of the staff provided from time to time by the Meteorological Committee

ii. Subject to the regulations and orders aforesaid, to carry out the details of administration of the Observatory in accordance with the instructions issued from time to time by the Director, to control and supervise the work of the members of the staff, to arrange their hours of attendance outside the prescribed office hours, grant leave of absence within the regulations and standing orders, and to carry out the provisions laid down for the occupation of the official guest rooms provided by the Government.

iii. To bring to the notice of the Director of the Meteorological Office any alterations or modifications in the equipment, methods or procedure of the Observatory, which may, in his opinion, increase its efficiency, but not to change the authorised methods and procedure without the Director's authority.

iv. In cases of emergency at the Observatory the Superintendent will act for the Director, reporting to him the action taken at the earliest opportunity.

7. (The salary of the Superintendent is £350 rising by £25 to £500, with an addition of £50 a year to be invested in endowment assurance, in lieu of superannuation allowance. The initial salary is determined at the time of appointment) The appointment is terminable in any year by six months notice, to expire on 15th May or 15th August. The Superintendent may be transferred to one of the other posts of Superintendent in the appointment of the Meteorological Office.

8. Leave of absence not exceeding six weeks from the Observatory in each year will be granted.

9. The Superintendent is allowed to take private pupils in scientific subjects, and to undertake the duty of lecturer in connexion with scientific or educational institutions, provided that he is not absent from the Observatory for more than four months in the year, inclusive of holidays, and that proper provision is made by him, subject to the approval of the Director, for carrying on the regular work of the Observatory in his absence.

10. He is not allowed to act as the regular correspondent of a daily paper, not to supply for copyright publication information which might properly be issued in official publications, or communicated to scientific journals, nor, without the permission of the Director, to make communications to journals on subjects with which the work of the

observatory

Observatory is concerned.

Note - The clauses in brackets are contingent upon the result of an application to the Treasury now under consideration of the Meteorological Committee. If the application be approved, the staff of the Observatory will consist of

Superintendent
Seismologist
(Assistant Meteorologist), Boy Clerk.
Clerk Assistant
Clerk Computer
Mechanic.

RULES FOR THE OCCUPATION OF THE OFFICIAL GUEST ROOMS OF THE ESKDALE OBSERVATORY.

1. The Superintendent will be responsible for providing suitable service and organising the arrangements for Guest Rooms so that they may be available when required for official use or for persons visiting the Observatory by permission of the Director for the purpose of study or research.

2. The Observatory funds will contirbute towards the expenses of hourskeeping as follows:-

A sum not exceeding £35 per annum for the wages of a head-servant
7s a week for the head-servant's board.
3s a day during a visit, with a minimum of 6s, for each visitor's board, including household washing.

3. The head-servant must be a responsible person who can take charge of the house, and of the catering for the Guest Rooms, during the absence of the Superintendent.

31st December, 1912.

Meteorological Office,
South Kensington, London,S.W.

Read - the following letter -

Burlington House,
London W.
7th March, 1913.

Dear Sir,

I am directed to inform you that the Gassiot Committee of the Royal Society at their last meeting considered applications for the vacant post of Superintendent at Eskdalemuir Observatory, and nominated Mr. Lewis F. Richardson for the position. Mr. Richardson's age is 31; he is married and he informed the Committee that he could take up the duties of the post after giving three weeks notice to his present employers. I enclose the papers which Mr. Richardson sent in in connexion with his application.

I am, &c..
ROBT. HARRISON.
Assistant Secretary,R.S.

The Director of the
Meteorological Office.

The regulations were approved.

The following minute was approved:-

ESKDALEMUIR OBSERVATORY.

On the nomination of the Gassiot Committee of the Royal Society, the Meteorological Committee have appointed Mr. Lewis F. Richardson, B.A.,Assistant Lecturer in Physics at the Municipal School of Technology, Manchester, to be Superintendent of the Geophysical Observatory at Eskdalemuir, in succession to Mr. G.W.Walker, M.A. resigned.

Meteorological Office,
London S.W.,
14th March, 1913.

The/

[Minute 385

The appointment was dated from 1st August, 1913, and was in the first instance for two years, as recommended by the Gassiot Committee (G.C.Minute, 25th July, 1912)

The commencing salary and scale of payment was approved as set out in the circular.

It was agreed that the Staff of the Observatory to assist the Superintendent be as set out in the circular with the omission of the professional assistant for meteorology for whom at present there is no accommodation available at the Observatory.

It was agreed to allow for the use of the Superintendent's house and guest rooms 12 tons of coal in the course of a year at the expense of the Observatory instead of asking him to repay his own estimated consumption and making a separate allowance for the guest rooms.

Read ° M.O. 4,810 from Mr. Walker:-

The Observatory,
Eskdalemuir,
Langholm,
Dumfries-shire.
30th December, 1912.

Gentlemen,

Before I leave I have to direct attention to one or two matters:-

1. The recording Dolezalek Electrometer is partly the property of the Government Grant Committee and partly mine, as I contributed about 25s from my pocket towards its purchase as the account rendered to the Royal Society will show.

2. I have spent a considerable sum in making a large vegetable garden, a flower garden, building a protecting dyke, planting a large number of fruit bushes and ornamental shrubs, making a lawn and building a summer house.

I am leaving those as I do not know my legal rights in the matter, but it seems to me that I am entitled to compensation for these things. The amount expended was between £15 and £20.

Perhaps you will consider the matter. A letter sent to Trinity college, Cambridge, will find me.

Yours faithfully,

GEORGE W. WALKER.

To
The Meteorological Committee.

It was agreed (1) that the question of the electronometer be referred to the Royal Society whose property is appears to be.

(2) That the Committee are unable to entertain the question of making an allowance out of the Observatory funds by way of compensation for improvements in the garden used by the Superintendent.

Magnet House (Minute 378).—Reported—that the work of examination of the effectiveness of the walls to keep out the water was proceeding with favourable results.

That the floor of the west room was being relaid—and that improvements of the external drainage were in progress by means of trenches cut to drain the reentrant corners of the porch, and the back of the mound.

Presentation of Books.—Reported—that a complete set of Reports of the British Association from 1860 to date and a number of volumes of Greenwich meteorological and magnetic observations had been accepted as a gift to the Observatory from Mrs. Theodore Williams.

It was agreed that the thanks of the Committee be returned for the gift.

Omori Seismograph (Minute 356).—Read—M.O. 1,020 from Professor F. Omori :—

Imperial Earthquake Investigation Committee,
Tokyo, Japan,
14th February, 1913.

SIR,

PLEASE accept the thanks of the Imperial Earthquake Investigation Committee for your kind letter under the date of 29th November, 1912, and for the Pocket Chronometer (Usher and Cole, No. 31,737) of the best English make presented to the said Committee in exchange for the Omori Horizontal Pendulum Tromometer. The watch has safely been received through the Japanese Foreign Office. I highly appreciate your good offices in the matter.

I am, &c.,
F. OMORI.

Dr. W. N. Shaw,
Director, Meteorological Office,
London.

Valencia.—Read—the following report by Mr. W. H. Hill :—

28, South Mall,
Cork,
6th February, 1913.

VALENCIA OBSERVATORY.

DEAR SIR,

IN accordance with your request we made a careful examination of the above house and premises and beg to report as follows :—

Tower.

The roof over the tower is leaky and in our opinion the construction of this roof is not suitable. It is covered with slates and the cost of repairs would be considerable owing to the difficulty of access.

The anemometer is fixed on a lead platform about 6′ × 6′ which forms the top of the tower roof and there is no doubt that the direction and force of the wind at this quarter must be influenced by the adjoining roofs. The platform is surrounded by a timber railing which has become defective and dangerous.

It would seem to us to be advisable to raise the anemometer so as to be above the influence of the surrounding roofs and we suggest that the tower be raised and that the new roof be flat and formed in re-inforced concrete or timber and covered with asphalte or vulcanite.

Dwelling House.

There is a good deal of damp observable on the internal surface of the walls. We made a careful examination of the inside of the roofs during heavy rain and find that the cause of the damp over the fireplace in the two principal bedrooms is due to defective chimney shafts over these quarters.

We recommend that these two chimney shafts be taken down as far as the first offset and that they be rebuilt in brickwork and that new flue linings be provided in the new portions, that the tops be surmounted with caps of concrete re-inforced with steel bars and that all be finished smooth with cement.

Repairs are also required in connection with the single chimney which is over the north-west bedroom.

The damp which appears over the drawing room window is due to defects around the window sill of the bedroom overhead.

It is evident that the timber work, or at any rate a considerable portion of it, in the eaves boards and soffits of the cantilever all around the roof is decayed and that part of the timber work in connection with the ornamental and other barge boards and timber work of the porch is also defective.

The external woodwork appears to have been painted from time to time but owing to the exposed position it is, generally speaking, very defective and requires a good deal of renewal.

It would be somewhat difficult to estimate the cost of the renewal of external woodwork without knowing more about its extent and I would not be disposed to recommend any considerable outlay in this direction at present.

The eaves shoots which are secured to the timber eaves boards are in a bad condition in many places owing to the want of sufficient hold for same in the woodwork. These shoots must be made secure and at the same time all the woodwork to which they are fixed.

The small gable of the entrance porch might, with advantage, be covered with some red tiles. This would not be costly and would be a far more lasting job than to recover same with timber as at present.

Water Supply.

Water from a surface stream is conducted into a pond near the house and is pumped to two tanks situated over the rear roofs of the house. The supply I am told is fairly constant but the quality of such water must be regarded with suspicion. The water is liable to contamination and the tanks into which it is pumped receives also the rain water.

It would be advisable if possible to obtain a pure water supply in connection with the Town Water Works which I understand are in progress.

There is no bathroom nor is there an installation for hot water. This defect could be remedied without difficulty if a gravitation water supply were provided.

Sanitary.

There is one w.c. in the house which is in good condition but the external soil and ventilation pipe should be renewed as they are defective.

The drainage is somewhat primitive but is not, in our opinion at present, a source of danger to health ; at the same time we would suggest a few modifications, including a Buchan trap and fresh air inlet on the soil drain and a suitable gully trap and some lengths of 4″ ware pipe in connection with the scullery drain.

The interior of the house is in excellent condition with the exception of injuries caused by damp.

The woodwork has been well looked after and the walls have from time to time been papered or distempered.

If you would kindly let us have your ideas about the raising of the tower and the forming of a flat roof on which could be placed the anemometer, &c. we would prepare draft plans for your approval.

We do not think that there is any immediate necessity for expenditure for internal decoration.

Yours faithfully,
W. H. HILL.

J. E. Cullum, Esq.

It was agreed that an estimate be obtained for the repairs and alterations set out in the report giving the amount for the alteration to the tower as a separate item.

386. AUXILIARY OBSERVATORIES.—**Falmouth** (Minute 364).—Read—the following letter :—

The Observatory,
Falmouth,
3rd March, 1913.

FALMOUTH OBSERVATORY.

DEAR SIR,

I HAVE been requested by my Committee to inform you that there seems to be no alternative but to give notice to the Staff at Lady Day next, and to the landlord of the land kept vacant round the Observatory, preparatory to terminating the work and closing the Observatory on the 30th June next.

They are compelled to adopt this course with great reluctance, and deeply regret that the useful career of an Observatory which has extended over 45 years will have to be closed so soon.

Yours faithfully,
WILSON L. FOX,
Hon. Sec., Observatory Committee of
Royal Cornwall Polytechnic Society.

The Director,
Meteorological Office,
London, S.W.

Inventories of M.O. property.—According to inventories made in 1868 and 1869 the Office owns various cupboards, tables, desks, photographic dishes, &c., &c., at the four auxiliary Observatories. It is proposed that all the articles which are not definitely meteorological instruments be written off.

It was agreed that separate inventories should be kept at the Observatories which include such things. We ought to have here a copy of an inventory of all the instrumental property, and due records should be kept of the fittings provided by the Office, so long as the Observatories remain in connexion with it.

387. Office Stations.—**Holyhead.**—Mr. T. Chope, the Superintendent of the Sailors' Home, in charge of the telegraphic reporting station at Holyhead, was reported seriously ill on 20th November, and died on 1st December. During the vacancy at the Sailors' Home the station was in charge of Mr. Weekes, Insurance Agent.

As objection had been taken from time to time to the exposure of the rain gauge, and it is undesirable to have the telegraphic work independent of the anemographic station, which is in charge of Mr. F. M. Cotton, C.E., Board of Trade Engineer, and William Davies, lightkeeper, Captain Harvey was asked to enlist the good offices of the Board of Trade to get the work consolidated. On receipt of the reply of the Board of Trade the Director called at Holyhead on 3rd February, 1913, to inspect the various available sites for the rain gauge and thermometer screen. Ultimately a suitable site was found in a walled enclosure on Salt Island, let by the Board of Trade to the City of Dublin Steam Packet Company as garden ground for the superintendent adjacent to the Dockyard.

It was arranged for William Davies to take over the telegraphic work on 1st May, and to train two boatmen as deputies, on the conditions laid down by the Board that Davies' house should be put in telephonic communication with the post office.

A sun recorder, thermograph and hygrograph are to be added to the equipment. The sun recorder is to be placed on the old lighthouse, and the other recording instruments in a special screen.

The annual payments for the new station will be as follows (see Minute 136) :—

	£	*s.*	*d.*
Primary work of Telegraphic Station ...	15	10	0
Additional Observations at 1 p.m. and 9 p.m.	3	15	0
Telegrams at 1 p.m. and 6 p.m.	2	10	0
Telegraphic bonus	3	3	0
Care of three Anemometers	15	0	0
„ Barograph	1	10	0
„ Thermograph...	1	10	0
„ Hygrograph	1	10	0
„ Sunshine Recorder	3	0	0
Total	£47	8	0

as compared with £28 1*s.* to the Sailors' Home and £20 to the Anemometer Station under the old arrangement. The Board of Trade suggest that of this sum £10 be given to Mr. Cotton for his services, and that the remainder be apportioned to Davies and his two deputies.

No reply has been received from the Post Office to the inquiry as to the cost of the telephone referred to above.

While these negotiations were in progress the Committee of the Sailors' Home had appointed a new superintendent, Mr. Joseph Seal, and desired that the duty of reporting should continue to be attached to the office. Accordingly they presented an ultimatum, dated 6th February, 1913, and on a return visit to Holyhead on 8th February it was arranged that Mr. Seal should be trained in the work by Mr. Weekes, and take it over for the remainder of the period as soon as he was competent.

The pay of the new station is to commence as soon as the observers are trained. They are to report at first by post-card. Mr. W. Hayes, Assistant in the forecast division, will go to Holyhead for a week to give instruction.

Spurn Head.—(Minute 333).—By permission of Trinity House the direction-velocity recorder made by Messrs. Munro to Mr. J. S. Dines's designs, and on trial since the end of July at Kew Observatory, has now been erected at Spurn Point on a site 110 yards S.W. of the lighthouse.

A new tower and shed was supplied and erected by Messrs. Thomas, of Worcester, leaving the trial tower and shed at Kew available for similar use again, as the cost of dismantling and removing from Kew came to within £5 of a new tower.

Mr. Dines spent the week ending 22nd February in visiting Spurn Point, and erecting the anemograph.

A sunshine recorder has also been provided on a bracket attached to the tower.

The provision of a telephone at the station has given great satisfaction to the men, and with the installation of the new instruments and the corresponding payments (£25 13*s.* per annum) the difficulties raised by the Trinity House as regards the continuance of the work at the station have been removed.

The first set of anemograms has come in—the traces are excellent and give evidence by the steadiness of the wind, both in direction and velocity, of the excellence of the exposure.

The total cost of the new installation is as follows :—

	£	*s.*	*d.*
Sunshine recorder	6	3	9
Tower and hut, including painting and bracket for sunshine recorder	44	0	0
Anemometer and direction recorder	74	10	0
Cupboard, &c.	1	6	8
Expenses of Mr. Dines and his assistant ...	11	8	7
Carriage of Anemometer from Kew to Spurn ...	3	5	0
Cost of tower left at Kew	31	17	2
Fencing for the same	8	18	0
	£40	15	2

Glasgow.—(Minute 373).—No reply has yet been received from the Corporation of Glasgow.

Oxford.—After five years of unproductive negotiation the observations for Oxford, the only telegraphic reporting station in the British Isles for which it has been impossible to obtain an observer at 7 a.m., on terms within the means of the Office, have been withdrawn from page 1 of the Daily Weather Report. They are sent by post-card for page 4, but the sunshine readings are still omitted on account of the risks of ascending the tower after sunset.

The payment to the observer is to be continued for the present, although no telegrams will be sent.

Bath is regarded as taking the place of Oxford.

Seathwaite and Dartmoor.—The payments to these two stations have been continued for the current year in continuation of the practice of the Royal Meteorological Society. The observer at Seathwaite is a private person, but at Princetown the observer is in the employment of the Home Office, and the Home Office might possibly regard Meteorological information as necessary in the public service if it were suggested to them.

It was agreed to represent to the Home Office the desirability of maintaining on an official basis the station now maintained at the prison by means of the gratuity from this Office.

388. Programme of Work for 1913.—Programme of Publications for 1913–14.—The Programme of Work for 1913, and the Programme of Publications for 1913–14, as printed in Minute 370, were approved.

New Publications.—The manuscripts of the following new publications were laid on the table :—

Instructions for Meteorological Telegraphy (new edition).

The Seaman's Handbook of Meteorology. A companion to the Barometer Manual for the use of seamen.

The International Kite and Balloon Ascents. A dissertation which obtained the first prize awarded by the Deutsche Meteorologische Gesellschaft. By Ernest Gold, M.A., Superintendent of the Statistical and Library Division.

The Free Atmosphere in the region of the British Isles. (Third Report.) The Calibration of the Balloon Meteorograph and the Reading of the traces. By W. H. Dines, F.R.S., Meteorologist in charge of investigations of the upper air.

A comparison of the electrical conditions of the atmosphere at Kew and Eskdalemuir. By Gordon Dobson, B.A., Graduate Assistant.

Lag in the Readings of Marine Barometers on Land and Sea. By Charles Chree, Sc.D., LL.D., F.R.S., Superintendent of Kew Observatory.

On the relation between the velocity of the gradient wind and that of the observed wind. By J. Fairgrieve.

It was agreed to print the first two publications in octavo, and the remaining five as Geophysical Memoirs (4to.)

Prize Essay of the German Meteorological Society.—The Director reported that the first prize of 2,000 marks offered in 1909 by the Deutsche Meteorologische Gesellschaft had been awarded to an essay by Mr. Gold on the International Kite and Balloon Ascents, and that the essay was communicated by the President of the Deutsche Meteorologische Gesellschaft, with the following letter :—

Berlin W. 56, Schinkelplatz 6,
den 11 Januar, 1913.

HOCHGEEHRTER HERR KOLLEGE!

IN der Annahme, dass die von der Deutschen Meteorologischen Gesellschaft preisgekrönte Arbeit des Herrn E. Gold in den "Geophysical Memoirs" erscheint, erlaube ich mir an Sie die ergebene Anfrage zu richten, ob Sie für diese Gesellschaft, zur Verteilung an ihre Mitglieder, 350 (Dreihundert und Fünfzig) Exemplare gegen Erstattung der Kosten für Druck und Papier (nicht für Satz) liefern könnten.

Mit dem Ausdruck vorzüglicher Hochachtung ergebenst,
HELLMANN,
I. Vorsitzender der Deutschen
Meteorologischen Gesellschaft.

Dr. W. N. Shaw, F.R.S.,
Director, Meteorological Office,
South Kensington, London, S.W.

It was agreed to accede to the request of the Deutsche Meteorologische Gesellschaft, and to request the Controller of the Stationery Office to supply 350 extra copies of Mr. Gold's paper at the cost of printing and paper for the use of the Gesellschaft.

389. FORECASTS.—**Milborne St. Andrew Farmers' Club.**—Read—the following :—

Milborne St. Andrew Farmers' Club,
Chesilborne, Dorchester.

DEAR SIR,

AT the monthly meeting of the above club, held on 17th February, the following resolution was adopted :—

"That the members of the Milborne St. Andrew Farmers' Club respectfully appeal to the Committee of the Meteorological Office to send a daily weather forecast to every Telegraph Office for the benefit of agriculturists and the public generally."

Yours faithfully,
R. E. BENNETT,
Hon. Sec.

To the Committee of the Meteorological Office,
London.

The following reply was authorised :—

SIR,

1st April, 1913.

THE resolution of the Milborne St. Andrew Farmers' Club was duly laid before the Meteorological Committee on 12th March, 1913.

I was authorised to say that the Committee are anxious to secure the wider distribution by telegraph of the daily weather forecasts for the benefit of agriculturists and the public generally by any means open to them. There is, however, no provision for the payment of the costs of telegrams conveying forecasts to country telegraph offices which, in accordance with the principle of accounting laid down by the Government in this matter, are chargeable against the account of this Office as sender, at the same rate as if the Office were a private person.

This makes it difficult for the Office to give the system of forecasting an effective trial, as, for example, by making a daily distribution to all the post offices in one county for a year, because, in order to provide the cost of the telegrams without a special grant for the purpose, it would be necessary to suppress part of the current work of the Office. That course is again beset with difficulty, because the current work of the Office supplies the material and the experience of Meteorology upon which the practice of forecasting is based.

In the year 1911 an application was made by the Committee to the Development Commissioners for a grant to enable a satisfactory trial of the regular distribution of forecasts to be made, but the application was ruled out of order because the reasons offered in its favour included advantages to the general public and not exclusively to agriculture and fisheries.

It seems, therefore, that we must wait either until some county or more restricted local area is willing to meet the expense of the telegrams for its own district, or the Government is willing to provide the necessary funds.

I may add that we trust that the trial may not be very long delayed as the indispensable machinery for the collection of the necessary information has now been made reasonably complete, but the machinery for the distribution of the information is sadly inadequate.

I am, &c.,
W. N. SHAW.

R. E. Bennett, Esq.,
Hon. Secretary,
Milborne St. Andrew Farmers' Club,
Chesilborne, Dorchester.

390. DIRECTOR'S REPORT AND ACCOUNTS :—

Conférence internationale de l'heure.—The official report of the Conference has been received : but the report of the British Delegates representing the Admiralty—a copy of which was asked for to form a report to the Committee—has not yet come in.

Superannuation Fund.—Mr. C. H. Thompson, who was in receipt of a pension of £76 13*s.* 4*d.* from 1st October, 1912, under Minute 366, died on 1st January, 1913.

Office Staff.—The work of the office has been much interrupted by absences through illness. In the Marine Division, Miss Anderson is frequently absent. Mr. Keeton has been invalided, and now Captain Hepworth is away : in the Statistical Division, Mr. J. D. Bell, and Mr. A. H. Bell, have been absent for short periods, and Mr. Braby has been ill with diphtheria since 30th January. In the Instruments Division, Mr. Wallace has been away for two periods, four weeks altogether ; Mr. C. G. West has been absent since January 6th with serious illness, and his father has been notified that his place will be regarded as vacant on 15th March.

Central Flying School, Upavon.—Apparatus has been supplied for the equipment of the Observatory for the Central Flying School at Upavon. Upon receipt of notice that the new term for instruction would begin on January 17th, and that a resident meteorologist was required, it was arranged

(1) That Mr. Lempfert should commence the course of instruction there on January 17th and that he should give a course of ten lectures on Meteorology in relation to Aeronautics.

(2) That so far as was compatible with his duties as Superintendent, he should be in residence at Upavon and give instruction in daily weather work, constructing a map from material sent from the office by telegraph, from the commencement of the course until February 7th.

(3) That Mr. G. Dobson, Graduate Assistant, who had been detailed to take temporary charge of the magnetic work at Eskdalemuir from 1st January, 1913, should take up regular duty at Upavon and take charge of the Observatory there, together with the instruction in daily weather work, as from 7th February.

These arrangements have all been carried out. Authority has been received from the War Office on 25th February for the resumption of the daily telegrams, in extension of a provisional authority obtained for the period of Mr. Lempfert's residence.

Forecasts for Aeronauts.—Mr. Lempfert has prepared a translation of the account given by Professor Assmann in the report of the Royal Prussian Observatory, at Lindenberg, for 1911, and he makes the following remarks upon the subject :—

Experience at Upavon, and the Lindenberg report on the special system of warnings to aviators, (translation herewith), has led me to consider the more effective organisation of our telegraphic stations from the point of view of forecasting line squall phenomena. At the present time our observers certainly do not use their barographs to the best advantage ; it is comparatively rare for an observer to report "line squall" in any message he sends to M.O. Thunderstorms are generally reported in "past weather" groups, and the more violent ones receive notice in notes at the end of the telegrams, giving time of occurrence, &c.

The information would without doubt be sent more effectively if there were an instruction to send a special report immediately after the occurrence of a line squall between the hours of 7 a.m. and 6 p.m. Line squalls occurring between 6 p.m. and 7 a.m. should be reported in the morning messages. Such an instruction would involve us in additional charges for telegraphy, and it is rather difficult to form an estimate of what the increased expenditure under this head would amount to. In some cases, we should also have applications for additional remuneration, and without such additional remuneration it would be difficult to induce some observers to give us an effective service. Possibly some scheme of bonus for effective messages could be thought out, which would offer the observer a direct inducement to keep a better look-out for these phenomena than he does at present, and to give us prompt information of their occurrence.

It would only be on very rare occasions that we could make use of the information in the 10 a.m. or 8.30 p.m. forecasts, and it would generally be quite out of date by the time it reached the public, but it might on occasion be very useful for special forecasts for individuals, for applicants on the list of special notifications in connexion with the harvest forecast service, and sometimes also for storm warnings ; for instance if all had worked smoothly, we might have got in a warning of the squall of 29th July, 1911, at our extreme S.E. stations an hour or so before the squall broke.

For really effective service, a considerably closer network of stations than that afforded by our telegraphic stations would probably be found necessary, but these might form a beginning. The revision of telegraphic instructions now in hand, offers an opportunity of working in changes.

REPORT on the WARNING SERVICE for AVIATORS of the Years 1911 and 1912, organised by the PRUSSIAN OBSERVATORY, LINDENBERG, by HERRMANN BOUGARDS.

Translated from Vol. VII. of the Annual Report of the Royal Prussian Aeronautical Observatory at Lindenberg.

Note.—An account of the forecast service of the Deutsche Seewarte, to which frequent reference is made in this Report, was printed in Minute 305.

As a consequence of numerous accidents which befell German aviators during the year 1910, the Director of the Royal Prussian Aeronautical Observatory at Lindenberg, Dr. Assmann, founded a "Warning Service for Aviators" in December 1910. As a knowledge of the air currents prevailing in the upper layers of the atmosphere is of special importance to aviators, the ordinary data available at official forecast centres were insufficient for the preparation of aviation forecasts of the kind contemplated. The Aeronautical Observatory was the only institution capable of supplying information of the kind required, but it is only in a position to determine the meteorological conditions of the atmosphere over Lindenberg, which taken alone cannot be of great value to aviators, as experience has shown that an adequate representation of the meteorological distribution over a large area cannot be derived from observations at a single station. As early as 1907 pilot balloon ascents had been made at a large number of places at the suggestion of Dr. Assmann on behalf of the Motorluftschiffstudiengesellschaft.

1.—*Organisation in* 1911.

(a) *Pilot Stations.*—This organisation, which had proved its utility, was extended by the Aeronautical Observatory supplying to a number of stations the necessary instrumental equipment. The current expenses were defrayed in the first instance for a period of three months by the Ministry of the Interior, and partly by the Observatory. In connection with the service a special telegraph line was installed between the Observatory and the Central Telegraph Office in Berlin at a cost of 8,000 Marks, of which sum the Post Office undertook 5,000 Marks, a public telegraph office being established at the Observatory. The work of the pilot balloon stations commenced on January 2nd, 1911.

In the first instance observations were made at the official forecast centres at Berlin, Hamburg, Magdeburg, Aachen, Dresden, Breslau, and Bromberg, and also by the Air Ship Battalion at Reinickendorf, the Aeroplane Factory at Bitterfeld, and the Aviation School at Elsfleth. In the course of the next few weeks the network was extended to include the forecast centres at Königsberg, Ilmenau, Weilburg, and Frankfurt a. M. Somewhat later the Meteorological Department at Strassburg joined in the enterprise, so that in all a network of 15 stations was established.

Each station was equipped with a Bunge balloon theodolite, made to a specification of the Aeronautical Observatory, and with a special balance for determining the free lift of the balloon, devised by Dr. der Quervain, of Zürich. Each station undertook to carry out ascents on all mornings when meteorological conditions permitted, the current expenses being defrayed by the Observatory. India-rubber balloons weighing 30 or 10 grammes and subsequently 15 grammes were issued. The smaller balloons, which rarely rise above 1,500 m., were used on occasions when low clouds or fog rendered observations at high levels impossible, in order to keep down expenses. The observations were telegraphed in code to Lindenberg. The data reported consisted of the time of the ascent, the amount of cloud, and precipitation before and after the ascent, the motion of the barometer, and observations of cirrus cloud, as well as the direction and velocity of air currents for specified height intervals up to the maximum attained.

At Lindenberg these records of air movement were entered on a large scale map, different heights being distinguished by different colours. Weather charts were constructed from data received from the Deutsche Seewarte, and so a conspectus of the weather conditions prevailing over Europe at the hour of morning observation was obtained. After completion of the charts, telegrams containing the more important wind observations made at the individual stations were coded and despatched to all co-operating forecast centres. Between 11 a.m. and noon the general warning telegram was completed. These messages were drawn up to apply as far as possible to any flights known to be in contemplation, and the special objects of such flights (long distance, long duration, arrival at special goals) were also borne in mind. As far as possible they gave numerical data, in place of the usual, and only too often ambiguous or indefinite qualitative expressions. Shortly before 4.30 p.m. a second telegram was received from the Seewarte reporting observations at 2 p.m. After this information had been charted an evening forecast was prepared at about 5 p.m., having special reference to the conditions of the following night and forenoon. The forecast was transmitted upon application, to all persons contemplating making ascents on the following day, before the issue of the morning's forecast.

(b) *Thunderstorm and Squall Warnings.*—When this service had been in operation for three months and the thunderstorm season was about to commence, the question of issuing to aviators warnings of thunderstorms, line-squalls and similar sudden atmospheric disturbances came up for consideration. From synoptic charts we can at present only determine a general tendency for the occurrence of such phenomena, and even this cannot be done with adequate certainty. The feasibility of establishing a network of stations over the whole of Germany, from which observers would transmit by telegram to a central institution information regarding thunderstorms coming under their observation, was therefore considered. Complete observations of all such phenomena would require a corps of about 7,000 observers. An organization on a scale such as this is not possible for financial reasons, and in consideration of the fact that most thunderstorms and similar phenomena advance from directions between South and North-west, several chains of "outposts" extending in parallel lines running from North to South were established over North Germany. Sufficient stations were established along each chain to give reasonable security that no important thunderstorm could penetrate it without coming under observation. In the interests of simplicity, stations on a meridian were selected as far as possible. In addition similar but less closely spaced chains of stations were established along parallels of latitude in order to be able to follow up thunderstorms during their

passage across the field between two meridians. The services of a number (about 400) of thunderstorm observers of the K. P. Meteorologisches Institut were secured through the courtesy of that Institute. The observations were transmitted by telegraph to the appropriate forecast centres. In establishing these stations the fact that most thunderstorms progress from South-west or West was kept in view, and hence the network of stations was drawn closer together in these directions. The observers sent their reports to the particular forecast centre whose district seemed to be menaced, which involved the issue of special instructions regarding the centres to which thunderstorms advancing from West, South-West, etc. had respectively to be reported. This arrangement necessitated the despatch of telegrams to several centres, but on the other hand it saved the despatch of telegrams to centres which had already experienced the thunderstorm. The paucity of thunderstorms with well developed linear front which was peculiar to the summer of 1911—and also to that of 1912—reduced the utility of this in itself rational method, so that it was soon discontinued, other circumstances contributing to the taking of this decision. The forecast centres warned the aviators of their district as occasion arose, and also transmitted the information to neighbouring centres if the disturbance appeared to be advancing further. Moreover each centre was instructed to report large disturbances to headquarters at Lindenberg as soon as sufficient data had been received for the determination of direction of propagation and rate of advance of its front. In addition the Post Office authorities consented to 18 Telegraph Offices reporting to Lindenberg all disturbances in their lines caused by thunderstorms. For this purpose those offices were selected whose lines stretch out furthest in all directions. The selected offices were Treves, Aachen, Frankfürt (Main), Münster, Leer, Hanover, Kiel, Schwerin, Neubrandenburg, Gardelegen, Erfurt, Görlitz, Breslau, Posen, Frankfurt (Oder), Köslin, Graudenz, Insterburg.

The fact that about one half of the selected observers thought they would be unable to undertake the work mainly on account of the distance of their homes from the Post Offices and the consequent unavoidable delay in the despatch of the telegrams, induced the Observatory to approach the Post Office authorities to allow the Postmasters at a number of smaller offices (second and third class) to undertake the work of reporting. These officers generally reside on the premises, and as the despatch of telegraphic reports involves no appreciable trouble, it was anticipated that the time occupied in transmission of the messages would be very short as the telegrams would be treated as service messages, and the central Observatory is connected with the head office in Berlin by a special wire. The consent of the Post Office was obtained at the end of July, 1911, and the service was organised early in August with 560 co-operating telegraph offices. The number of reporting stations could be kept within comparatively modest limits as offices equipped with Morse instruments can detect thunder disturbances at great distances, and thus the great distances between them could be bridged over. As the season of frequent thunderstorms was nearing its close the organisation of the year 1911 could not give a satisfactory trial of the utility of the system.

II.—*Organisation of* 1912.

The continuation of the warning service during the financial year 1912 having been sanctioned by the Ministry of the Interior and the Ministries of War, Public Works, Agriculture, Crown Lands and Forests, and Education, and funds for another trial year to the extent of 31,000 Marks having been voted, the service was reorganised on the lines described below as a result of the experience gained.

A subsidiary central Institution for Western Germany was established at Frankfurt a. M. in connexion with the official forecast centre already existing there. This modification was made with the object of reducing the time of transmission of warnings to West Germany by simplifying the telegraphic connexions, a matter of special importance, as most thunderstorms and line-squalls advance from the West. For the same reason arrangements were made for the forecast centre at Aachen to receive notifications of thunderstorms from 20, later on 30, stations in Western Germany as well as from a number of Dutch and Belgian stations.

(a) *Pilot Stations.*—Pilot balloon ascents are made during the months May to September inclusive on all days (Sundays included) when conditions are favourable. The ascents are made at or before 7 a.m. and they are continued to the greatest possible heights. On days offering no prospect of attaining an altitude of 1,000 m. no ascents are made, or if made the results are not reported. The results of the ascents are telegraphed, in code as described above, and the telegrams must be handed in sufficiently early to render their receipt at the central institution by 9.20 a.m. practically certain, so that their contents may be transmitted from the central institutions to the official forecast centres and reach these before 10 a.m., the hour at which forecasts are drawn up. As soon as dwindling daylight necessitates later ascents with the result that the telegrams reporting the observations would not reach the central institutions by the specified hour without reducing the heights attainable, the ascents are made between 10 a.m. and 1 p.m. The official forecast centres at Aachen, Frankfurt a. M., Hamburg, Magdeburg, Berlin, Breslau and Königsberg, and also the Meteorological Observatory at Bremen, are regarded as the principal pilot balloon stations. Except in the case of Aachen, which provides its own equipment, these stations are supplied from Lindenberg with india-rubber balloons weighing 60 and 30 grammes, which with an ascensional velocity of 180 metres per minute can be relied on to attain heights of 8,000 m. or 4,000 m. respectively in the course of 40 minutes. If the atmosphere is clear and fairly calm, rather smaller ascensional velocities are adopted and then heights of 9 km. or 4 km. respectively can be attained.

The forecast centres at Bromberg, Breslau, Ilmenau and Weilberg constitute secondary pilot stations, and are equipped with rubber balloons weighing 20 and 30 grammes, which can be sent up to best advantage with ascensional velocities of 150 m. per minute. Only the principal pilot stations despatch a telegram to the central institution on each occasion when the 1,000 m. level is reached. The secondary stations only report when 3,000 m. is reached.

From 1st June, 1912, the pilot stations at Aachen and Bremen, and also the secondary stations at Weilburg and Ilmenau have addressed their telegrams to Frankfurt, Hamburg, Magdeburg, Berlin, Königsberg, and Breslau, and the secondary stations at Bromberg and Dresden have reported to Lindenberg. Both the central institutions, Frankfurt and Lindenberg, compile from the data received by 9.20 a.m. in summer and 2 p.m. in winter telegrams which are despatched by 9.30 a.m. or 2.30 p.m

as the case may be, to all official forecast centres, and also to Bremen. Frankfurt also receives the results of the pilot balloon ascents made at Strassburg, Friedrichshafen and Munich, and includes them in its telegrams if they are received sufficiently early. The cost of the ascents at these last three stations are defrayed locally, but the expenses of telegraphing them is defrayed from the funds of the warning service.

Frankfurt does not send its telegram to Lindenberg until 1 p.m., in winter 4 p.m., and incorporates in it also all information received after 9.20 a.m., including the reports from Strassburg, Friedrichshafen, and Munich. Lindenberg transmits the results of its daily principal ascents—except on Sundays—to all Prussian forecast centres. These ascents are commenced at 7.30 a.m. and are continued till about noon as circumstances permit. As the tabulation of the ascents takes about an hour, the telegram cannot be despatched till about 2 p.m., if the ascents are prolonged. The telegram gives particulars of the vertical distribution of temperature, humidity, and wind direction and velocity, and also of any temperature inversion encountered.

(b) *Daily Weather Service.*—In order to be able to make use of the results of pilot balloon ascents in forecasting they must be considered in connexion with the distribution of meteorological conditions at the surface, as shown on a synoptic chart. For this reason a meteorological service similar to that carried on at the official forecast centres is maintained at Lindenberg. From the information given in the telegrams received from the Deutsche Seewarte, which come to hand between 9.30 a.m. and 10 a.m. each morning, isobaric charts are constructed for the epochs 8 a.m. of the day of observation and 8 p.m. of the previous day. In addition to this several isallobaric charts are constructed. From the morning telegrams the changes of pressure during the 12 hour intervals from 8 a.m. to 8 p.m. of "yesterday" and from 8 p.m. of "yesterday" to 8 a.m. of "to-day" are computed. The barometer tendency gives the changes between 5 a.m. and 8 a.m. on the day of the telegrams, while a comparison with the previous day gives the changes during the 24 hours ending at 8 a.m. Isallobaric charts are constructed from these telegrams for two intervals of 12 hours, one of three hours, and one of twenty-four hours. In addition there are drawn charts of isallotherms and of the distribution of rainfall for the interval of twenty-four hours. From these eight charts taken in conjunction with the data supplied from pilot balloon stations and by the ascents made at Lindenberg itself forecasts are drawn up shortly before 11 a.m. in which such phenomena as are likely to prove of importance to aviators receive special consideration. At about 4.30 p.m. another telegram is received from the Seewarte, reporting the 2 p.m. observations. From the observations given therein a synoptic chart, and an isallobaric chart for the six-hour interval (8 a.m. to 2 p.m.) are constructed. Evening forecasts based on this information are drawn up about 5 p.m. They refer to the evening, the night, and the forenoon of the following day. The shortness of the time to be covered by the forecast and the large amount of data available have made it possible to achieve a high percentage of successes in these forecasts.

(c) *Thunderstorm warning service.*—The arrangements started at the end of the previous season for observing and reporting thunderstorms and line-squalls at small postal telegraph offices proved satisfactory, they were therefore continued and extended in 1912. 608 observing stations were selected in Northern and South-western Germany. Postal telegraph offices of second or third class were mainly selected as the postmasters generally live on the premises at the smaller offices. The postal authorities gave permission for the work to be done, but the co-operation of individual observers was entirely voluntary and honorary. Reports were received with great promptitude from most observers. Telegraph offices situated in the districts controlled from Metz, Speyer, Karlsruhe, Würzburg, Bamberg, Regensburg, Treves, Coblenz, Darmstadt, Frankfürt a. M., Aachen, Cologne, Düsseldorf, Dortmund, Münster, Oldenburg, Minden, Konstanz, and Cassel reported to the central institute at Frankfurt, all others to Lindenberg. Of the 18 telegraph offices to report interruptions in the circuits as described in the report for the previous year, those at Aachen, Leer, Münster, Hanover, Frankfurt, Treves reported to the head office at Frankfurt as well as to Lindenberg.

The thunderstorm reports received at the head offices are entered on large wall maps, and for more detailed study on paper charts, and the data thus set out are used for compiling telegrams to be sent to all forecast centres where districts appear to be threatened by thunderstorms, line-squalls, and similar disturbances. These telegrams give the time and place and the direction of propagation of the thunder disturbance, and if possible also its rate of advance. The forecast centres then in turn warn all aviators in their districts who have applied for warnings or forecasts. The head offices at Lindenberg and Frankfurt exchange warning telegrams whenever a line-squall appears likely to extend from the district kept under observation by the one institute into that of the other. The forecast centres at Aachen, Weilburg, Ilmenau and Magdeburg, and also Bremen, are generally warned of the approach of thunderstorms by Frankfurt; all others are warned from Lindenberg. But on all occasions when thunder reports are received at Lindenberg from stations near the boundary of the Frankfurt district, Hamburg, Magdeburg, Ilmenau and Bremen are warned directly from Lindenberg. The two central institutions issue their warnings and forecasts, if special application be received, to any place, no matter which district it may be in.

In spite of the not inconsiderable funds which have been allocated to the warning service by the various public departments referred to, it has not been possible to supply forecasts and warnings as has been the custom hitherto, only upon repayment of the charges for transmission. A charge has had to be made from 1st July, 1912. The fees are low in consideration of the expense of the service and the value of the property to be protected by the organisation. The fee for a telegraphic forecast is five marks; that for a forecast by telephone, or a thunderstorm warning, two marks. These fees are increased in the event of forecasts being required during the night, or if special services are called for, while subscribers are entitled to a considerable reduction.

Soon after its establishment at the end of January and beginning of February, the warning service was in operation in connexion with the transport of the military airship M. III. to Metz. The utility of the forecasts was acknowledged on this occasion by the Airship Battalion. Similarly the German circular flights of June and July, 1911, afforded the new organisation an opportunity of proving its value. A special report on this period has been prepared. The

following tables give a summary of the number of applications for forecasts received up to 15th September, 1912 :—

FORECASTS, 1911.

Month.	Military Authorities.	Airships.			Societies or Private Persons.	Total.
		Zeppelin.	Schutte-Landz.	Parseval.		
January	33	—	—	2	8	43
February	12	—	—	2	17	31
March	1	—	—	—	18	19
April	—	—	—	2	14	16
May	—	—	—	12	29	41
June	—	—	—	17	18	35
July	—	—	—	3	13	16
August	—	—	—	8	6	14
September	—	—	46	39	12	97
October	—	4	48	17	8	77
November	—	1	43	5	25	74
December	—	—	—	4	12	16
Total	46	5	137	111	180	479

FORECASTS, 1912.

Month.	Military Authorities.	Airships.		Societies or Private Persons.	Total.
		Schutte-Landz.	Parseval.		
January	—	—	6	10	16
February	12	—	—	7	19
March	—	—	—	17	17
April	—	49	8	22	79
May	1	53	3	25	82
June	7	55	—	38	100
July	2	29	—	21	52
August	7	33	4	8	52
September (1st to 15th)...	6	6	1	12	25
Total	35	225	22	160	442

THUNDERSTORM WARNINGS.

Month.	Forecast Centres.	Military Authorities.	Total.
June	28	12	40
July	17	4	21
August	21	—	21
September (1st to 15th)	6	6	12
Total	72	22	94

Among the important aeronautical events of the year 1912 for which the warning system was in operation may be mentioned, the meeting at Posen in June 1912, the distance flight from Berlin to Vienna, the flight in North Brandenburg, the "sport week" at Kilberg in July, and the Manœuvres in September. During the flights in North Brandenburg a number of thunderstorm stations were instructed to report directly to the threatened district as well as to headquarters, in order to accelerate communication of information regarding line-squalls or thunderstorms likely to affect the flight area. This arrangement was found to work well. From the central observatory at Lindenberg it was possible to issue effective warnings of approaching severe thunderstorms to places where flights were in progress on three occasions. Also, on the occasion of the Kaiser Manœuvres, it was possible for the military forecast service, specially organised by the military authorities for the sake of the aviators taking part in the operations, to give notice of the approach of thunderstorms and line-squalls on four occasions. Thus the aeronautical warning service has had many opportunities during the brief period of its existence of showing that it is a useful—in view of the present-day development of aviation we might even go so far as to say indispensable—organisation.

The Seventh Volume of the Report of the Lindenberg Observatory also contains a report by Dr. Josef Reger of his work as field meteorologist during the German circular flights in June and July of 1911. The field meteorologist accompanied the aviators throughout the greater part of their course,

and arrangements were made for transmitting to him all the information normally sent to an official forecast centre either from Lindenberg or from the Seewarte, Hamburg. As a Post and Telegraph Office was established on each day's camping ground no difficulty was experienced in supplying the information, as the telegraph authorities did all in their power to make matters work smoothly. This travelling forecast centre was also equipped with apparatus for conducting pilot balloon ascents. In addition to the official forecaster, an officer of the service was sent on to the goal of the following day's flight to conduct pilot balloon ascents there and report the results to each day's starting point. The ordinary afternoon service of the Deutsche Seewarte was also augmented during the period of the flights.

Telegrams from America for daily charts.—Reported—the following letter from the Director of the Meteorological Service of Canada, and report thereon from the Superintendent of the Forecast Division :—

Meteorological Office, Toronto,
9th January, 1913.

DEAR SIR,

I ENCLOSE herewith a circular (No. 147 of the Great North Western Telegraph Company of Canada) regarding cable rates, which may perhaps be of interest to you. It seems probable that cable rates on meteorological telegrams will in future be lower than in the past.

I am, &c.,
R. F. STUPART,
Director.

Dr. W. N. Shaw, F.R.S.,
Director,
Meteorological Office, London, S.W.

In the preparation of the Daily Charts in the Weekly Weather Report we now plot about 30 stations from the American side. This information could be transmitted in a cablegram of 90 words, allowing three words (name and two code words) for each station. The cost of such a cable, if sent as a "deferred cable," would be 8·1 dollars, or say £2, per day. Some reduction in the number of stations might be accepted and the cablegrams reduced in length by special coding. The minimum expense would be not less than about 15*s.* per day. With "deferred" telegrams from America we might publish in the Weekly Weather Report the maps of the Northern Hemisphere, with the statistical tables for the British Isles for the same period, instead of issuing them one week later like we do at present. The information for Siberia, which we transcribe from the Russian Daily Report, would be complete normally, but it would be missing on occasions of public holiday in Russia, or of postal delay between St. Petersburg and London.

We should have to omit or make arrangements for transmitting by cable the information which we now transcribe from the Egyptian Daily Report, at any rate for two or three days of each week. The "deferred" cable rate to Egypt is 6*d.* a word. Information for three stations could be sent in a cablegram of eight words (including address).

The information for the Atlantic shown on the maps would be that now shown on the charts published in the North Atlantic Charts. There would be practically no information for the Western Atlantic, while for the eastern half of that Ocean the information would be less full than it is at present. Temperature observations would be decidedly deficient, as wireless reports do not give temperature data.

Wireless Telegrams.—Reported—that in reply to an inquiry addressed to the Post Office on behalf of the Director General of Indian Observatories, regarding the treatment of meteorological radiograms under the International Radiotelegraph Regulations as revised at the International Conference in London, 1912, the following extract from the regulations had been received from the Post Office :—

EXTRACT FROM INTERNATIONAL RADIOTELEGRAPH REGULATIONS.

(Revision of London, 1912.)

13. *Transmissions météorologiques, horaires et autres.*

Article XLV.

1. Les Administrations prennent les dispositions nécessaires pour faire parvenir à leurs stations côtières les télégrammes météorologiques contenant les indications intéressant la région de ces stations. Ces télégrammes, dont le texte ne doit pas dépasser 20 mots, sont transmis aux navires qui en font la demande. La taxe de ces télégrammes météorologiques est portée au compte des navires destinataires.

2. Les observations météorologiques, faites par certains navires désignés à cet effet par le pays dont ils dépendent, peuvent être transmises une fois par jour, comme avis de services taxés, aux stations côtières autorisées à les recevoir par les Administrations intéressées qui désignent également les bureaux météorologiques auxquels ces observations sont adressées par les stations côtières.

3. Les signaux horaires et les télégrammes météorologiques sont transmis à la suite les uns des autres de manière que la durée totale de leur transmission n'excède pas dix minutes. En principe, pendant cet envoi, toutes les stations radiotélégraphiques dont la transmission peut troubler la réception de ces signaux et télégrammes, font silence de façon à permettre à toutes les stations qui le désirent de recevoir ces télégrammes et signaux. Exception est faite pour les cas de détresse et les télégrammes d'État.

4. Les Administrations facilitent la communication aux agences d'informations maritimes qu'elles agréent des renseignements concernant les avaries et sinistres maritimes ou présentant un intérêt général pour la navigation dont les stations côtières peuvent régulièrement donner communication.

In reply to a further inquiry as to whether the radiograms now being received by the Office under its agreement with the Marconi Company (Minute 242) would be regarded as coming within the scope of the regulations the following letter was received :—

General Post Office,
London,
16th January, 1913.

SIR,

WITH reference to your letter of the 28th of November last, T.C. 100/4358, I am directed by the Postmaster General to inform you that priority of transmission will be accorded to such radiotelegrams from British ships as may be sent to the Meteorological Office under the arrangement referred to in the Post Office letter of the 11th of February, 1910, No. 374843/07, after the 1st July next, when the International Radiotelegraph Regulations as revised at London came into force.

* * * * * * *

I am, &c.,
E. CRABB.

Ice Scout for the North Atlantic.—The Director and Marine Superintendent have taken part in a Conference summoned by the Board of Trade to consider the question of sending a vessel to observe the break-up of ice and its approach to the steamer tracks in the Western North Atlantic.

As a result it was arranged to recommend the sending of an ice scout to the Davis Strait to be chartered for three or four months from February, 1913; the Board of Trade and the shipowners contributing equal shares of the expense.

It was also arranged that the ship should carry an Oceanographer and assistant, and a Meteorologist and assistant, and that facilities should be provided for the investigation of the upper air.

The details of the arrangements were committed to Captain Monro and Captain Young, of the Board of Trade, with Captain Hepworth, and Mr. H. Leak as Secretary. The former Whaler "Scotia" has been chartered.

The Office has been asked to supply a Meteorologist to work with Mr. Matthews, of the Marine Biological Association, as Oceanographer and Mr. Crawshay as assistant. Mr. G. I. Taylor, Schuster Reader, has been allowed to take the post of Meteorologist, on the understanding that he will make up the time of the Readership by continuation for a corresponding period beyond the three years. As it is understood that there is not room on the "Scotia" for more than three scientists, no assistant has been appointed to the Meteorologist, but he will be assisted as may be necessary by the Oceanographers.

The following programme has been drawn up, and the apparatus provided, on the understanding that at such short notice it was not possible to give strict "marching orders," and that it was best to provide a liberal supply of apparatus and leave Mr. Taylor to use his discretion as to what part of the programme he should attempt and how far he should carry any experiments.

Meteorological Programme.	*Instruments required.*
A. 1. Four-hourly Log, as taken in the Mercantile Marine. The Meteorologist will give special supervision. Special observations will be made at 7 a.m., 1 p.m., and 6 p.m. G.M.T. for correlation with the International Weather Service Maps.	Thermometer Screens. Thermometers. Thermograph. Barograph. Hygrograph.
A. 2. Salinity, Density, Temperature, and Electric Conductivity in the neighbourhood of ice and elsewhere.	Electrical self-recording apparatus and ordinary hydrometers.
A. 3. Comparison of wind at different heights. Anemometry.	Cup Anemometers (and one recording P. T. Anemometer).
A. 4. Investigation of the conditions above fog by kites.	Kite outfit.
A. 5. Investigation of the drift of upper air by pilot balloons with special reference to the cause of the drift of ice Eastward.	60 large balloons. 30 small balloons. Sextants. Hydrogen, 4000 c.ft.
A. 6. Investigation of the temperature of the Upper Air.	30 Sounding balloons. 15 Instruments.
B. 1. Investigation of humidity. This will include a comparison of the efficiency at sea of the wet and dry bulbs in an ordinary screen, compared with those mounted in an Assmann Psychrometer.	Assmann Psychrometer.
B. 2. Measurement of rain at sea. Comparison of raingauges fixed at different heights.	Raingauges (ordinary and possibly recording on gimbals).
B. 3. Examination of the working of barometers with different constrictions.	Two barometers.

Section A refers to work especially related to Ice Observation.
Section B refers to work of general importance in navigation.

Considerable difficulty was experienced in getting a kite equipment. Mr. Dines had a hand winding gear, and a power gear that wanted repair, and he had no kites available, but could supply four meteorographs. At Mr. Gold's suggestion, a letter was sent to Geheimrat Assmann, of Lindenberg, asking him to supply, upon repayment, one kite of each of two patterns and a meteorograph. In reply, he sent the following letter, and the apparatus has already arrived :—

Lindenberg,
(Kreis Beeskow),
Den 6. Februar, 1913.

HOCHVEREHRTER HERR KOLLEGE,

IHR freundlicher Brief vom 28. Januar d. Js., A.T. Reference Number 124, ist mir erst gestern, am 5. Februar zugegangen, sodass ich erst heute imstande bin zu antworten. Ich habe deshalb soeben folgendes Telegramm abgesandt : Weather London : Letter 124 just received. Please telegraph latest date for sending instruments. Assmann.

Ihr Wunsch, bei der in Aussicht genommenen englischen Expedition in den Nordatlantik Apparate und Drachen des Königl. Preussischen Aeronautischen Observatoriums in Gebrauch zu nehmen, macht mir grosse Freude, einesteils wegen des grossen Wertes, den ich persönlich auf Ihre Freundschaft lege, anderteils deshalb, weil das Observatorium dadurch die erwünschte Gelegenheit findet, Ihnen seinen Dank für die so Lebhafte und wirkungsvelle Unterstützung abzustatten, die Sie seiner Ostafrika-Expedition im Jahre 1908 haben angedeihen lassen : drittens aber möchte ich die Gelegenheit englische und deutsche Wissenschaft auf dem Meere gemeinsam in Tätigkeit zu sehen, mit ganz besonderer Freude begrüssen, da nach meiner Meinung die inneren Beziehungen zwischen diesen beiden Nationen so grosse sind, dass sie schliesslich auch in der Politik zum Durchbruch kommen müssen.

Ich habe also angeordnet, dass spätestens am Montag den 10 Februar von hier folgende Gegenstände unter der Adresse ; The Director of the Meteorological Office, South Kensington, London, S.W., abgesandt werden :—

(1) 2 vollständige Marvin kite meteorographs für Luftdruck, Temperatur, Relative Feuchtigkeit, und Windgeschwindigkeit, Trommeln für 4 stündigen Umlauf, dazu eine Reservetrommel und 100 Registrierpapiere. Eichungskurven für die Auswertung. Diese beiden Apparate werden als Postsendung expediert werden.
(2) Eine Kollektion von 6 Drachen : 2 dreiflächige Drachen von 7 qm Drachenfläche, 1 zweiflächiger von 6 qm, 1 Schirmdrachen von 5 qm, 2 Hilfsdrachen von 4 qm Flächeninhalt : sämtlich mit elastischem Zügel (nach Rotch) und Reservestäben. Anleitung zum Zusammensetzen und zum Gebrauch.
(3) 3 Stäbe zur Befestigung der Registrierapparate in den Drachen.
(4) 5 Drahtklemmen zum Ansetzen von Hilfsdrachen.

Die Drachen nebst Nebenteilen werden als Eilgut abgesandt werden.

Sämtliche Gegenstände werden dem Meteorological Office zur uneingeschränkten Verfügung gestellt und gehen als ein Beitrag des Königl. Aeronautischen Observatoriums Lindenberg zu der Expedition *ohne Entgelt* in das Eigentum des Expeditionsfonds resp. des Meteorological Office über. Als Gegenleistung wird nur der Wunsch ausgesprochen, das diese Beteiligung des Observatoriums an der Expedition in geeignet erscheinender Weise zum Ausdruck gebracht wird und dem Observatorium Kopien der mit den gelieferten Apparaten gewonnenen Registrierkurven, sowie einige Exemplare der Publikation über die Ergebnisse der Expedition übermittelt werden.

Mit der Hoffnung, dass die Bedienung der Apparate und Drachen keine unüberwindlichen Schwierigkeiten bereiten, und dass die Expedition einen recht schönen und grossen Erfolg haben möge, der um so wertvoller sein würde, weil an beiden Seiten, in Grönland wie in Spitzbergen, Parallelbeobachtungen durch die Brüder Dr. Alfred und Dr. Kurt Wegener ausgeführt werden, bin ich,

Mit freundschaftlichen und hochachtungsvollen Gruss,

Ihr ergebenster,

DR. ASSMANN.

Herrn Dr. Shaw,
Direktor des Meteorological Office,
London.

As Mr. Dines's power gear could not be got ready in time, it was decided to accept an offer of apparatus at a cost of £24 from Mr. Sotheby, of Dwyran, who, in correspondence with the Office, had made a kite gear to Mr. Dines's model and now wished to sell it. It was accordingly sent up, but as put together in the Office it is found to be unusable, and it seems doubtful whether it can ever have been used. In the end, gear was borrowed from Mr. Cave, of Ditcham Park, who had already lent a number of kites.

The "Scotia" is to sail from Dundee on Saturday, March 7th. She is to send reports of the progress of her observations of ice by "wireless" to a station on the Newfoundland coast, which are to be transmitted to this Office for communication to the steamship owners and others. A code has been prepared, approved by the Sub-Committee, and printed for the Board of Trade. The Sailing Directions are as follows :—

Instructions for Captain Robertson, S.S. "Scotia."—Being in all respects ready you should proceed with all despatch to Lat. 44° N., Long. 50° W., reporting on the way any ice met with and endeavouring to note its southern limit. From this position proceed to St. John's noting and reporting all ice met with.

On arrival there you should get into communication with the Wireless Stations on the coast of Newfoundland and Labrador, and as far as possible ascertain the existing condition of the ice and where it has commenced to move.

Coal and provisions should be replenished at St. John's with all possible despatch, and leaving that port you should proceed to and report the southern limit of the drifting ice. Then proceed Northward searching for icebergs, field ice, and other forms of ice, either drifting or temporarily fast along the east coast of Newfoundland and Labrador as far North as Hamilton Inlet. After passing that Inlet, proceed to the Southward locating the eastern and then the Southern limit of ice. Then call at St. John's for further orders.

All observations of ice movement and currents should be considered valuable.

Special vigilance should be observed in watching for ice that is nearing the Steamer Routes.

Every opportunity should be taken of communicating with the Wireless Stations on the coast of Labrador and Newfoundland, viz : Indian Harbour, Domino Island, Venison Island, Battle Harbour, Chateau Bay, Belle Isle, Point Rich and Cape Race.

It must be borne in mind that the object of the Expedition is to give warning to the steamship lines of the probable quantity of ice that will be in the vicinity of the track, and to give them any information which will assist them to form a judgment as to the advisability of giving any instructions for the greater safety of their vessels. In order to obtain accurate scientific data, three scientists have

consented to accompany you, and you should consult with Mr. Matthews, the senior of these gentlemen, as to the movements of the vessel and the messages to be sent, so that the object of the Expedition may best be served, bearing in mind that you are entirely in charge of the vessel and responsible for the safety of her and her crew.

Except when it will interfere with the object of the Expedition, all opportunity should be given to the scientists to obtain the data which they require and every assistance that is possible should be rendered to them. These observations will be mainly for determining the direction, velocity, and depth of currents, with the temperature and salinity of the water, &c., and meteorological observations of the upper air including the investigation of the currents and temperature will also be carefully taken.

All information with regard to the ice and its present and probable movements should be communicated by you as often as practicable in accordance with the annexed instructions to a land wireless station for transmission direct to the Meteorological Office who will publish it as necessary. In addition to this any vessel in touch should be warned either by the code in the instructions or by ordinary message. All enquiries as to the future movements of the vessel, &c., should be addressed to the Board of Trade, from whence further instructions as to return to England or other orders will be sent to you.

Should time permit you may be required to make a détour on your passage home northward to Cape Farewell; thence proceeding along the south-east of Greenland to Denmark Strait, for the purpose of ascertaining the conditions, as regards ice, that exist off the south and south-east coasts, which should be examined as closely as a running survey, at a reduced speed, will permit. The set and velocity of the current should be estimated at the same time. The state of the ice in Denmark Strait should then be observed and the southern limit of the ice-barrier determined.

The velocity and temperature of the cold East Greenland current, which flows southward on the western side of the Strait, and of the warm Irminger current which flows northward on the eastern side, should be measured, at and below the surface, by current meter.

The following has been issued by the Board of Trade :—

Notice to Owners and Masters of Merchant Vessels crossing the North Atlantic.

The Board of Trade in co-operation with the principal North Atlantic Steamship Lines are sending out the "Scotia" for the purpose of Ice observation off the East Coast of North America to the north of the steamship routes. The "Scotia" is fitted with wireless apparatus and will communicate the results of her observations to the land stations on the coast of Newfoundland and Labrador for transmission to the Meteorological Office and the steamship lines.

The "Scotia" will also be prepared to transmit to any vessel within range a similar report containing particulars of the nature of the ice observed, the direction and rate of its drift, the weather conditions at the ship, &c.

For the purpose of making these reports a code has been prepared and copies may be obtained by the master of any merchant vessel carrying wireless telegraphy engaged in the North Atlantic trade on application to the Assistant Secretary, Marine Department, Board of Trade, London, S.W.

ERNEST G. MOGGRIDGE,
Assistant Secretary.

Marine Department,
Board of Trade,
March, 1913.

Eskdale Observatory.—In order to provide as far as possible for continuity in the work of the Observatory at the termination of the notice given by the Superintendent (Mr. G. W. Walker) on December 3rd, Mr. G. Dobson, Graduate Assistant at Kew Observatory, was directed to give further attention to the details of the magnetic work at Kew until December 24th and to proceed to Eskdalemuir on December 31st to take charge of the magnetic work there. Mr. Walker unfortunately left early on that day, so that there was no opportunity for Mr. Dobson to obtain any verbal instructions. The Observatory was placed in charge of Mr. L. H. G. Dines, and the work has been carried on without any break.

With a view to the appointment of a new Superintendent, a sub-committee of the Gassiot Committee drew up the statement of duties printed on p. 244. The statements as to salary and staff require either approval or modification.

At the meeting of the sub-committee, Dr. Glazebrook mentioned that Dr. J. A. Harker, F.R.S., principal assistant in the Thermometry Division of the National Physical Laboratory, was on the point of leaving the King's Sanatorium at Midhurst where he had been undergoing treatment for an affection of the throat, and that as Dr. Harker was advised to spend six months in a bracing climate before taking up his work again at Teddington, it might be convenient on all sides for him to take duty for six months at the Observatory, provided that satisfactory arrangements could be made about education for his children and about furniture and service at Eskdalemuir.

Before leaving the Observatory Mr. Walker had removed all the furniture from the Superintendent's house, leaving only a summer house and various plants in the garden, for which he now applies for compensation. Consequently, although the guest rooms are fully furnished, the house was not even provisionally habitable.

It was ultimately arranged that the Office should furnish the kitchen department, a ground floor room for servants, the hall, staircase and landing, and the Superintendent's room in the office block. This has been done at a cost of £59 11*s.* 2*d.*

Dr. Harker undertook to act as Superintendent for six months, and to remove from his own house the furniture required for the living rooms of the house during that period.

The arrangements with regard to finance are that the incidental expenses of removal will be refunded to Dr. Harker, that his usual salary will be paid in full by the National Physical Laboratory,

and that the Office will repay to the Laboratory any balance of £200 that remains over when the incidental expenses of removal have been met.

Dr. Harker took up duty at the Observatory on Saturday, 1st February. The Report of Work for February has been received and shows that the work of the Observatory has been satisfactorily maintained.

The Gassiot Committee met on Wednesday, February 26th, to consider applications for the vacant post of Superintendent of the Observatory, and they have nominated Mr. L. F. Richardson for appointment.

Before the new Superintendent enters upon his duties in August, it is desirable that he should become acquainted with the work of a similar character done at other Observatories in this country and abroad.

We have been reminded from time to time by the Executive of the International Commission for Terrestrial Magnetism that we have undertaken if possible to compare the standard magnetic instruments of this country with those of other countries. The occasion seems to be a proper one for meeting that obligation. The new Superintendent might first spend a month at Kew and Greenwich comparing the absolute instruments of those two observatories, visit Falmouth, Valencia, Stonyhurst, and Eskdalemuir, making a comparison at each. He might then proceed to Val Joyeux and Potsdam to compare the magnetic instruments, and go on to Pulkowa to see the seismological installation under Prince Galitzin's direction. The cost would probably be met by an allowance of £1 a day and travelling expenses, extending from 14th May to 1st August, when the Superintendent would take up his duties at Eskdalemuir.

Reports of Work for December, 1912, January and February, 1913.—1. *Marine Division.*—Examined 75 new meteorological logbooks, one abbreviated logbook, and five lighthouse registers.

Monthly Meteorological Charts of the North Atlantic and Mediterranean.—Issues for January, February, and March published. Issue for April sent to lithographer. Drawing charts for weekly issue. Charting sea temperature and air temperature, December, January, February and March. Registering and acknowledging observations, issuing charts and renewing supply of forms. Obtaining corrections for three barometers. Received 320 North Atlantic registers, Form 121; and 164 radio-telegraphy registers, Form 138.

Monthly Meteorological Charts of the Indian Ocean.—Issues for January, February, March published, and that for April in course of preparation. Received 44 reports of Indian Ocean weather, Form 122. Obtaining corrections for three barometers.

Wireless Telegrams from Ships.—Preparing weekly list of sailings. Extracting and tabulating marine observations; also preparing each week a sea-temperature chart of the North Atlantic for Division II. Obtaining corrections for 65 barometers. Acknowledging reports, and issuing copies of instructions and observation forms.

Admiralty Sailing Directions.—Tabulating data for British Columbia and Japan ports, 124 hours at 2*s*. 6*d*. = £15 10*s*. 0*d*.

Reports of Ice to "Shipping Gazette."—Three.

Monthly limits of Icebergs and Field-ice in the North Atlantic.—Completed.

Extraction of observations relative to Yellow Sea :—32 logs.

Extraction of observations relative to Davis Strait, weather, &c. :—73 logs.

Observations in Indian Ocean.—Copying observations for Indian Government, six hours at 2*s*. 6*d*. = 15*s*.

Indexing Data in Ocean 10° Squares.

2. *Forecast Division.*—(1) Current Work has been kept up to date.

(2) Number of wireless messages has been :—

(*a*) From H.M. Ships, December, 12; January, 8; February, 8.

(*b*) From Ships of Mercantile Marine, December, 417; January, 398; February, 377.

(3) Corrections to Daily Weather Report up to January prepared.

(4) Forecast Checking up to 30th September.

(5) Wind Frequency tables prepared up to end of December.

(6) Working Charts prepared for binding up to October 23.

(7) Inquiries :—

	Dec.	Jan.	Feb.
Prepaid Replies	7	20	6
Other Telegraphic Inquiries	6	8	8
Wireless Inquiries	0	0	1
Telephone Inquiries	2	4	5
Personal Inquiries	0	0	1

(8) From January 20th to February 7th the Superintendent resided at the Central Flying School, Upavon, to start the meteorological department there pending Mr. Dobson's arrival to take up the duties. During this period the data for constructing a morning map were telegraphed each day to Upavon. This service has again been in operation from 27th February.

(9) Since 1st January the maps of the Weekly Weather Report have been issued in a new form. The area included extends from the Pacific coast of America to the Pacific coast of Siberia. By delaying the issue of the map for one week, reasonably complete meteorological data for the whole of this area can be abstracted from the American, Russian, Egyptian and other daily weather reports.

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, 1912 and 1913.

Parts I. and II.—Weekly and Monthly Issues up to date.
Appendices I. and II. for 1912 completed and issued.
Appendix III. for 1912 ready for press. Two-thirds of the work on the Quinquennial Appendix giving monthly averages for different stations for the period ending with the year 1910 has been done during December, January and February, mainly by working about 400 hours of overtime.
Annual Summary to Part II. for 1912 completed, including a table of monthly rainfall at 90 additional stations.

Part III. Section 1.—Monthly issues up to date. Volume for 1912 completed and issued.
Section 2.—May, 1912, issued. June, 1912, sent to printer.

Part IV. Section 1 :—
Kew, June issued ; August sent to printer.
Valencia, July issued ; August sent to printer.
Eskdalemuir, July issued ; August sent to printer.
Section 2.—Aberdeen, Summaries completed up to May.
Falmouth, Summaries completed up to March.

The examination of the Observatory records and of Sunshine Cards, the tabulation of cup anemograms, and the summaries of pressure tube anemograms have been kept up to date.

The photographic barograms at Kew Observatory have been tabulated in millibars from February 16th, 1913.

Library :—	Dec.	Jan.	Feb.	Total
Authors' cards prepared for Catalogue	71	50	35	156
Inquiries :—				
Newspapers	6	8	5	19
Legal	13	16	7	36
Scientific and Commercial	39	46	59	144
Forecasts	3	1	3	7
General	1	—	1	2
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Receipts in connexion with Inquiries ...	8 7 9	13 5 0	4 5 6	25 18 3

4. *Instruments Division.*—Admiralty work.—Supplies have been sent to Portsmouth, Bermuda and Bombay. The new system of accounting for Admiralty instruments, which was approved by the Committee in July 1912, will come into operation on April 1st.

Marine work.—Eighteen ships have received supplies directly from the office ; the stocks of three agents have been replenished.
New instruments have been sent to nine sea temperature stations.

Stations.—A new barograph has gone to Donaghadee, a raingauge to Deerness and a thermometer to Stornoway. Details of the equipment sent to Spurn and Holyhead are given in Minute 387.
Twenty new storm cones have been sent out, including six for the Northern Lighthouse Board.

Observatories.—A Stevenson screen of twice the standard size was sent to Kew, as well as a thermograph to go in it ; the hygrograph was already at Kew. A similar screen, with thermograph and hygrograph, went to Valencia.

Private requisitions.—Thirty-one local authorities and private observers have been supplied with instruments on repayment. A set of meteorological instruments has been sent to the Putumayo Mission in Brazil. The equipment of the meteorological station at the Flying School, Upavon, has been completed by the supply of an anemometer of the same style as the one sent to Spurn, and a pair of recording theodolites made to Mr. J. S. Dines's design.
The meteorological outfit for the S.S. "Scotia" was prepared in February. It includes three captive balloons, thirty sounding balloons, and sixty pilot balloons, 4,000 cubic feet of hydrogen, about twenty kites, with the appropriate winding gear, two Assmann's psychrometers, with fan ventilation, a Callendar recorder for sea-temperatures, as well as the ordinary marine meteorological instruments.

Colonial requisitions.—Nine consignments have gone to the Colonies and Dominions, the largest being for Rhodesia and South Africa.

Loans.—A set of meteorological instruments for use on board ship has been lent to the Easter Island Expedition.
The set of instruments used for instruction at the offices of the Mercantile Marine Association at Liverpool has been replenished.
Two fishery barometers have been re-issued. A small anemometer has been lent to Dr. Cornish for experiments on board ship. A specimen storm cone has been sent to the Director of the Spanish Meteorological Service at Madrid.

Meteorograph boxes have been sent to seven persons.

Exhibition.—In connection with the exhibition of apparatus illustrating the application of scientific principles to aeronautics, which was open at the Science Museum, South Kensington, from the last week of December to the end of February, the office contributed materials for a section devoted to meteorology.

Workshop.—The machine tools for the workshop have been delivered, and are in course of erection.

Inventory.—The list of instruments belonging to the office is being verified : as no comparison has been made previously between the entries in the office books and the instruments actually in the possession of persons to whom they have been lent, numerous discrepancies have been found, mostly in the numbers of the instruments.

5. **Investigation of the Upper Air** (Mr. W. H. Dines's Report for the quarter ending 31st December, 1912).—Work has been carried on as usual during the quarter, and an attempt has been made to send up a registering balloon each week. For long periods at a time the weather has been such as to render the chance of recovery small, but, in all, eleven balloons have been sent up and seven recovered.

As will be seen from the accounts, a good many instruments have been sold, and Baker's time has been very fully occupied in making them. Since other institutions are unable to obtain the apparatus used here commercially, I have not liked to refuse requests that I have received from Mr. Hunt, Mr. Stupart, Dr. Trabert (Vienna), Mr. Davis (Argentine) and others, but I think the policy of selling instruments at cost price has been carried far enough. On the other hand, 50 registering balloons were sent up by the Meteorological Office last year, 41 here, 9 from Crinan, and since the direct out-of-pocket expenses for each balloon reaches nearly £2, if no receipts beyond the grant were available the work would have to be curtailed.

It is very satisfactory to be able to state that every instrument that was returned last year to Pyrton Hill, viz. 23 out of 41, had reached and recorded the isothermal. This result has been obtained by never keeping the balloons in stock for any time; they have been ordered as required and used quickly after their receipt. But the percentage recovered has been very low.

I have to report that my landlord has (apart from legal formalities) sold this house, and I shall have to turn out, possibly in September next, but most likely in March, 1914.

Publications.—Report for December, 1912, January, February, 1913 from Clerk of Publications :—

—	December.		January.		February.	
	Received.	Issued.	Received.	Issued.	Received.	Issued.
Daily Weather Report	800	790	800	789	835	820
Weekly Weather Report ...	375	321	375	321	375	323
Monthly Weather Report, &c. ...	575 (Nov.)	457	575 (Dec.)	457	575 (Jan.)	464
Do. do. (Maps) ...	25	2	25	2	25	2
Daily Readings	100 (Oct.)	49	100 (Nov.)	49	100 (Dec.)	—
Geophysical Journal	—	—	150 (Mar. & Apr.).	132	—	—
Hourly Values.—Meteorological—						
Kew ...	300 (Mar.)	11 (Mar.)	300 (Apr.)	11 (Apr.)	300 (May)	11 (May)
Eskdale ...	300 „	11 „	300 „	11 „	300 „	11 „
Valencia ...	—	11 „	300 (Apr. & May).	11 „	300 (June & July).	11 „
Do. —Geophysical—1911	—	329	—	3	—	—
Monthly Meteorological Charts (Atlantic).	600 monthly to Jan. (3).	449	600 monthly to Feb. (3).	570	600 monthly to Mar. (3).	669
Monthly Meteorological Charts (Indian).	—	165	350 (Feb. & Mar.).	467	—	336
International Upper Air Observations.	50 (July–Sept., 1910).	31	—	—	50 (Oct. & Nov., 1910).	31
Seventh Annual Report ...	—	4	—	4	—	2
Observer's Handbook (1911) ...	—	2	—	14	12	7
"Forecasting Weather" ...	—	2	—	1	12	2
Cloud Atlas	—	1	—	—	—	1
Report—Commission for Weather Telegraphy.	150	—	—	63	—	4
Report—Commission for Maritime Meteorology.	200	42	—	15	—	5
Summary of Signals	—	42	—	19	—	4
Calendar, 1913	—	—	500	372	—	10
Structure of the Atmosphere ...	—	—	—	—	13	1
Geophysical Memoirs, No. 1 ...	—	10	—	2	—	5
No. 2 ...	—	8	—	2	—	3
No. 3 ...	—	5	—	—	—	3
No. 4 ...	—	5	—	—	—	2

Receipts from sales at M.O.—December, 1912, £4 4*s.* 4*d.*; January, 1913, £1 2*s.* 8*d.*; February £2 4*s.* 1*d.*

New Publications.—The Calendar for 1913 has been issued.

Year Book, 1911.—Hourly Values, Meteorological Section. 188 stitched copies were received in November, and 155 copies were issued in December. Year Book, 1912.—Meteorological Observations at Stations of the First and Second Orders. The volume is now complete, and 150 stitched copies have been received.

The Reports of Proceedings at Meetings of the Commissions for Maritime Meteorology, &c., and for Weather Telegraphy, have been received and issued as shown above.

M.O. Press.—During the three months ended 28th February, 1913, the issue of the Periodical Publications has been as follows :—Daily Weather Report, maps for the Weekly Weather Report, maps for the Monthly Weather Report, Monthly Meteorological Charts, North Atlantic, Monthly Meteorological Charts, Indian Ocean.—As contract.

On 1st December, 1912, there were three requisitions for forms, diagrams, &c., outstanding. Since that date seven requisitions have been issued and seven discharged, leaving three requisitions still in hand.

755 additional copies of the Daily Weather Report have been printed during the period in compliance with requests received from Educational Authorities.

Branch Office.—Mr. J. S. Dines's Reports of Work (December, 1912).—I have been engaged during the month in working up and discussing the results from the pilot balloon ascents made at Farnborough in October and November. The wind velocities have been shown in diagrammatic form, and attached to the daily weather reports for the several days of the ascents.

Some quick runs have been taken on the anemograph on special occasions.

Certain repairs and alterations have been made to one self-recording theodolite.

Wise has been engaged in scraping and repainting the anemometer tower on days when the weather was suitable, and has devoted the remainder of his time to work for the Meteorological Office.

(January, 1913).—I have completed a further part of the working up and discussion of the series of pilot balloon ascents made at Farnborough in November last.

Some quick runs have been taken on the anemometer on special occasions.

An apparatus has been constructed capable of giving extremely open time scales on the anemograph.

Wise has completed scraping the tower, and applied a first coat of paint.

He has devoted the remainder of his time to work for the Meteorological Office.

(February, 1913.)—The discussion of the South Farnborough pilot balloon results has been completed.

Some further experiments have been made on the behaviour of pressure tube recording anemometers in a gusty wind, and a report has been prepared on this subject.

I was away one week at Spurn Head in connection with the erection of an anemograph there.

Wise assisted in the erection of the Spurn Head anemograph. He has helped in the observational work at Pyrton Hill and has completed painting the anemometer tower. He has devoted the remainder of his time to work for the Meteorological Office.

Observatories.—Kew (December, 1912).—The barograph, thermograph and anemograph (Robinson Cup) curves have been tabulated as usual and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	4
	Inclination	4
	Horizontal force	4
Potential gradient		on 15 days.
Wilson apparatus		„ 6 „
Ebert apparatus		„ 6 „
Pyrheliometer		„ 2 „

International cloud observations were made on three days.

A scale value determination was made of the horizontal force magnetograph.

The Superintendent has been absent, ill, since 11th December.

(January, 1913).—The barograph, thermograph and anemograph (Robinson Cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	6
	Inclination	5
	Horizontal force	5
Potential gradient		on 16 days.
Wilson apparatus		„ 11 „
Pyrheliometer		„ 8 „

International cloud observations were made on three days.

Owing to Mr. Dobson's absence at Eskdalemuir, it was necessary to limit the absolute observations in atmospheric electricity, and the best course seemed to be to suspend those with the Ebert apparatus.

Scale value determinations were made of the electrograph and seismograph.

Photographic paper has been supplied to Aberdeen, Eskdalemuir and Oxford Observatories.

The velocity direction pressure-tube anemograph intended for Spurn Head was dismounted by Mr. J. S. Dines on 16th January and despatched within the course of a day or two to Spurn Head.

The Superintendent has been away, ill, all the month.

(February, 1913).—The barograph, thermograph and anemograph (Robinson Cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	5
	Inclination	4
	Horizontal force	4
Potential gradient		on 19 days.
Wilson apparatus		14 „
Pyrheliometer		5 „

International cloud observations were made on four days. The Superintendent returned to work on the 5th.

A scale value determination of the vertical force curves was made on 18th February.

Tabulations were made of three weeks' curves from the float barograph, and a report was sent to the Office embodying a comparison of these data with those derived from the photographic barometric curves and the eye-readings of the working standard barometer.

The barograph tabulator has had a millibar scale put in it by Mr. Hicks.

Senor Duarte spent part of two days at the Observatory to see the meteorological and magnetic work.

The Housekeeper was unwell for two or three days, but is now better.

Eskdalemuir (December, 1912).—Buildings.—The trench in the concrete in the magnet-house was completed. Water is standing to the depth of fully ½-inch nearly all round it. Water has again penetrated the dwelling houses at the old places during the severe weather. The plaster roof of the coach-house fell.

Meteorology.—The normal work has continued. The instruments are in good order except the anemometer, which still sticks at times. The pen thermograph appears to freeze at the joints in cold weather.

Magnetism.—The instruments are in good order, but the piers are still suffering from the recent disturbance. The tabulation has proceeded and will be carried as far as possible before I leave on 31st December.

Seismology.—I have done all the seismology this month and the instruments are in good order. Tabulation has been carried to the date of the latest Pulkowa Bulletin received.

Solar Radiation.—No observation was possible.

Electricity.—The electrograph is in good order and tabulation will be carried as far as possible.

No opportunity occurred for use of Ebert's apparatus.

G. W. WALKER.

(January, 1913).—Mr. Walker left on 31st December and Mr. Dobson arrived the same day as temporary assistant. Thanks to his help and to the co-operation of the permanent staff, the work of the Observatory has proceeded satisfactorily.

Dr. Harker visited the Observatory for three days in the middle of the month to make arrangements for his arrival later on as temporary superintendent. A few things have been done to his instructions preparatory to his setting up some experimental apparatus of his own and a hexagonal trench 100 ft. in diameter has been dug in the grounds with the same object. The Sunday work has been re-arranged to give a clear week end off to Messrs. Gendle and Parkinson alternately.

Buildings.—Nothing further has been done to the Magnet house by the Office of Works ; a large excavation by the side of the door still remains open. The water still lies in the trench cut in the concrete inside, and there seems by the smell to be dry rot present in the floors.

Seismology.—All the instruments have been working throughout the month with the exception of a few days lost on the Omori and the Wiechert. The examination of the Galitzin records is in arrear. Several small details in the fittings of the V. Galitzin have been improved. The Galitzin and Milne instruments have worked well throughout the month. The Omori and Wiechert have never given satisfactory results since they have been installed, and with a view to improving their performance experiments have been made with each to find out the cause of the defects.

The result in the case of the Wiechert has not been as successful as could be wished, but a great deal of information has been gained about it ; and the two writing points are now practically independent, which they have not been before. I hope to improve the sensitiveness in time. The time marker has now been connected up with a clock and marks the sheet once an hour.

Mr. Dobson took the Omori in hand and has greatly reduced the friction of the writing point ; the pendulum has been made much more free in its movement and experiments are still in progress to reduce friction at the pivots of the magnifying lever. It has now shewn microseisms better than any other, save the Galitzins.

Meteorology.—The usual observations and tabulations have been carried on. The anemometer has been cleaned and is working better. No solar radiation observations have been taken.

Magnetism and Electricity.—*See* Mr. Dobson's separate report.

L. H. G. DINES,
Acting Superintendent.

Magnetographs.—The usual absolute observations of the horizontal force, declination, and inclination, have been made, and the base values of the magnetographs obtained from them. The usual scale tests have been made once a fortnight. In the case of the vertical force magnetograph scale tests have been made once a week on account of the very erratic values which it had been giving in the previous months. The usual rapid drift continued on this instrument, and on 25th January it became necessary to readjust it to prevent the trace going off the paper. It appeared to take a long time to settle down after this, and the values for the next day are of very doubtful value.

Two redeterminations were made of the moment of the auxiliary magnet used in the scale tests The moment was found to have decreased slightly since the last determination.

Electrograph.—The usual scale tests have been made, and the scale value has been rather more variable than would be desired. Two redeterminations have been made of the factor for converting the potential in volts as shown on the Electrograph into the potential gradient in volts per metre in the open. The factor was found to have changed from 5·5 to 5·4. Two different methods are in use at Kew and Eskdalemuir for determining the absolute potential gradient in the open. An experimental apparatus similar to that used at Kew was made, and a direct comparison of the two methods was made. As was to be expected the Eskdalemuir method gave slightly higher values for the potential gradient, but the difference was rather less than 4%.

Much trouble had always been experienced with the jet of the electrograph becoming blocked by small particles of dirt. A strainer was therefore fitted in the pipe from the tank to the jet and no trouble has since been experienced.

No observations have been made with the Ebert apparatus.

GORDON DOBSON.

(February, 1913).—General.—The work of the Observatory has been maintained during the month, and the changes in the Staff do not appear to have occasioned any considerable disturbance of

the ordinary routine. Mr. Dobson left on February 1st, leaving the records of the work of his special department, that of Magnetism, in a condition very satisfactory for transfer to new hands. Dr. Harker came on the 4th, and the members of his household on the 7th, after the furniture from Maple's and from Teddington had been installed in the Superintendent's house.

Seismology.—There have only been very minor earthquakes during the month. The records of all the instruments have been normal, the Galitzin instruments sometimes showing microseisms of considerable amplitude, at others comparatively small or none at all. The improvements made last month in the Omori instrument by Mr. Dobson and Mr. Dines seem to have greatly increased its usefulness, and it now shows microseisms, when they are present on the Galitzin records, in a way it was not in the habit of doing.

Magnetism.—The usual absolute observations have been taken during the month and the routine maintained ; some of the computing is however a little in arrear.

The vertical-force magnetograph continues its uncertain behaviour, but is still working, and its results are being tabulated. Scale tests are taken of it at more frequent intervals than usual.

Dr. Harker brought up with him a second vertical-force recorder of the balance type, with a suitable drum, kindly lent to him by Dr. Watson, F.R.S. This instrument has been installed temporarily in the west room, and has been run continuously for about three weeks with apparently satisfactory results. To ensure reasonable dead-beatness by employing a sufficiently long time of swing, it is found that its sensitiveness as now working, which has not been changed since the beginning, is five or six times as great as that of the Adie instrument. There appears in practice to be no objection to this, as the record of the Adie instrument during a disturbed time only rarely changes more than about a centimetre. When the workmen have completed the floor of the west room it is intended to instal this instrument with more permanent fittings, and to put automatic time marks on the trace.

Atmospheric Electricity.—The electograph behaved erratically at the early part of the month, and a few days' records are of doubtful value. The whole installation was completely overhauled, and is now working normally, and has given no further trouble.

Research Work.—With a view to a possible elucidation of some of the causes of terrestrial magnetism, preliminary steps have been taken to start some research work in this direction.

A stationary vertical-force inductor consisting of a large hexagon of lead-covered wire has been fixed round the upper part of the grounds, the ends of the wires being brought to the West magnetic hut, till now unused. To these was connected an extremely sensitive ballistic galvanometer of suitable period and damping, whose movements were recorded on a fast running photographic drum

In addition, two 50 metre east-west and north-south earth-current lines have been installed with high resistance photographic recording voltmeters registering the changes of potential between the plates. Preliminary experiments with these are proceeding.

The ultimate scheme is to obtain on fast traces with simultaneous time signals, records from the inductor of the small sudden changes in the value of V which are shown, sometimes, during a disturbed period, changes in the earth currents in the two directions, and a sensitive record on the Watson quartz-fibre vertical-force magnetograph, whose moment of inertia is much smaller than the usual type, and it is hoped that from a study of these some definite information may be gathered. Encouraging preliminary experiments show that the inductor idea is quite practicable.

Buildings, &c.—The coach-house ceiling has been re-made by the Office of Works contractors and is now satisfactory, and the other repairs are proceeding.

Mr. Ryle, Assistant Architect of the Office of Works and the Clerk of the Works visited the Observatory on the 20th, and went into the question of the damp in the magnetograph house. The cutting of the trench inside the building has made considerable improvement, particularly in the West room, and the amount of water in the trench is now much less than formerly. The Office of Works are taking further steps to improve the state of the house by deepening the internal protecting drains.

J. A. HARKER,
Superintendent.

Accounts.—Reported the receipt of the following letter :—

M.O. 4602.

Exchequer and Audit Department,
Victoria Embankment,
London, E.C.,
12th December, 1912.

SIR,

I AM directed by the Comptroller and Auditor-General to refer to the circular letter from this Department dated 22nd February, 1911, and to subsequent correspondence, as a result of which it was arranged that vouchers of your Department for each financial year should be returned to you as soon as the examination of the following year's account has been completed here.

The Comptroller and Auditor-General has been in correspondence with the Public Record Office on the subject of the ultimate destruction of such vouchers, and he is advised that, although it is now the practice to return them as a matter of course, and not to await a request before doing so in accordance with the terms of the "Schedule of Documents existing or accruing in the Department of the Comptroller and Auditor-General" approved and submitted to Parliament in the year 1884, yet the provisions of that Schedule are still in force. To comply with those provisions I am desired by the Comptroller and Auditor General to request that your Department will communicate with His Majesty's Stationery Office from time to time with a view to the destruction of any of these returned vouchers, over seven years old, which it is not desired to preserve. I am at the same time particularly to call your attention to Rule 13 of the Rules of the Master of the Rolls that "destruction shall be effected under the direction of the Controller of His Majesty's Stationery Office," and not by Departments themselves.

I have, &c.
G. Y. VANDERZEE.

The Accounting Officer,
Meteorological Office, S.W.

Submitted—The following Statement of Accounts for the Nine Months ending 31st December, 1912 :—

RECEIPTS.						PAYMENTS.					
1911.				1912.		1911.				1912.	
£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
1,298 16 3	Balance from year 1911-12	—		404 6 4		750 0 0	Director	—		750 0 0	
12,637 10 0	Parliamentary vote..	—		12,750 0 0			OFFICE SALARIES :				
						5,756 3 7	Monthly	5,735 11 4			
	OBSERVATORIES :					495 3 10	Weekly	682 10 10			
802 10 11	Kew	791 4 3								6,418 2 2	
1,119 15 1	Eskdalemuir ...	1,148 19 5					OBSERVATORIES :				
17 10 0	Valencia	59 5 5				1,207 0 11	Kew	1,237 2 7			
—	Farnborough ...	400 0 0				1,019 7 6	Eskdalemuir	1,065 5 1			
				2,399 9 1		352 0 5	Valencia	403 7 11			
	DEPARTMENTAL EXPENSES REPAID :					—	Farnborough... ...	262 9 11			
140 11 2	Forecasts, &c. ...	135 10 4								2,968 5 6	
	Marine, Statistics, and Observatories	76 7 8					OFFICE EXPENSES :				
85 8 8						512 12 2	Rent, Fuel, &c. ...	524 16 1			
27 11 2	Instruments ...	53 10 6				476 5 9	Furniture, Fittings, &c.	255 9 5			
				265 8 6		293 1 8	Incidental	265 14 6			
	INCIDENTAL EXPENSES REPAID :									1,046 0 0	
258 4 4	Forecasts, &c. ...	297 8 0					POSTAGE AND TELEGRAMS :				
40 12 0	Other Branches ...	55 15 8				228 4 3	General Postage ...	228 3 7			
	Stationery Office						Postage of Daily				
31 7 2	Account ...	33 8 7				261 3 11	Weather Reports ...	270 19 11			
				386 12 3		1,996 17 10	Telegrams, &c. ...	1,509 18 1			
	TELEGRAPH CHARGES REPAID :									2,009 1 7	
193 2 10	Home	171 6 8									
	Telegrams sent					280 13 9	TRAVELLING EXPENSES AND INSPECTIONS...	—		304 18 4	
380 1 6	abroad	340 13 4									
				512 0 0		1,086 12 0	SUPERANNUATION ...	—		1,030 7 0	
7 10 0	INSTRUMENTS : Royal Navy ...	7 10 0									
	Mercantile Marine,						COST OF INSTRUMENTS:				
975 0 1	Stations, &c. ...	2,085 5 11				314 12 6	Royal Navy	428 6 5			
				2,092 15 11			Mercantile Marine,				
	OBSERVATORY					1,324 10 7	Stations, &c. ...	2,269 5 4			
63 14 5	FORMS, &c. ...	—		87 3 3						2,697 11 9	
—	INSPECTIONS ...	—		156 12 5							
						1,661 14 10	AUXILIARY OBSERVATORIES, &C.	—		1,612 1 9	
	SUPERANNUATION ACCOUNT :										
428 2 6	Annuities	536 5 0				227 11 2	LECTURES AND EXPERIMENTS	—		262 10 0	
	Interest on Investments	39 14 6									
67 11 0											
	Income Tax returned	8 15 0					BALANCE :				
17 10 0						879 7 10	Cash at Bank ...	636 5 7			
				584 14 6							
	LECTURES AND EXPERIMENTS ...	—		160 0 4		44 4 8	,, at Office ...	63 18 11			
575 0 1										700 4 6	
£19,167 9 2				£19,799 2 7		£19,167 9 2				£19,799 2 7	

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
1,741 2 2	To sundry creditors	2,011 18 10		923 12 6	By cash at Bank and at Office ...	700 4 6	
50 0 0	,, salaries reserved	16 2 3		383 18 6	,, Admiralty	496 6 9	
441 2 2	,, balance	396 14 10		259 19 9	,, M. O. Instruments in Stock ...	568 11 7	
				597 12 4	,, sundry debtors	659 13 1	
				67 1 3	,, superannuation	—	
£2,232 4 4		£2,424 15 11		£2,232 4 4		£2,424 15 11	

NOTE.—On 31st December the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £2,119 5*s.* 11*d.*

Observatories.—Statement of Accounts for the Nine Months ended 31st December, 1912 :—

KEW.

1911.	*Receipts.*	1912.
£ s. d.		£ s. d.
446 17 11	Gassiot Trust	447 13 0
281 5 0	National Physical Laboratory ...	281 5 0
5 0 0	Grazing Rents	5 0 0
69 8 0	Miscellaneous	57 6 3
404 10 0	To Balance	445 18 4
£1,207 0 11		£1,237 2 7

1911.	*Payments.*			1912.
£ s. d.		£	s. d.	£ s. d.
506 10 10	Superintendent			506 10 10
304 19 8	Assistants			312 16 2
61 2 6	Caretaker			72 1 4
12 0 0	Sundays and holidays ...	11	6 1	
70 16 6	Overtime	73	14 3	
				85 0 4
90 8 1	Rent, fuel, and lighting			64 4 8
1 3 7	Repairs			17 19 7
—	Insurance			7 2 9
41 13 2	Materials			46 4 10
35 19 5	Instruments			81 19 8
29 7 10	Books, printing, and stationery			1 8 0
52 19 4	Incidental expenses ...			41 14 5
£1,207 0 11				£1,237 2 7

ESKDALE.

1911.		1912.
£ s. d.		£ s. d.
1,000 0 0	Royal Society (Parliamentary) Grant)	1,000 0 0
—	Salary of Assistant in Seismology to 31st March, 1912	108 6 8
104 9 10	Dr. Schuster	—
15 5 3	Miscellaneous	40 12 9
£1,119 15 1		£1,148 19 5

1911.				1912.
£ s. d.		£	s. d.	£ s. d.
300 0 0	Superintendent			300 0 0
261 4 2	Assistants			367 3 0
81 18 0	Mechanic and Caretaker			78 18 4
39 0 0	Handyman			38 19 3
9 19 0	Books, stationery, &c. ...			7 6 0
1 3 8	Insurance			5 19 8
32 12 9	Travelling expenses ...			16 7 4
	Incidental expenses :—			
27 15 0	Rental of private wire	28	15 0	
125 3 1	Instruments and repairs	17	18 0	
38 12 7	Photographic paper ...	51	2 3	
75 5 10	Coals and carriage of coals, light	55	17 2	
—	Repairs, &c.	61	14 4	
26 13 5	Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	35	4 9	
				250 11 6
100 7 7	Balance in hand ...	—		83 14 4
£1,119 15 1				£1,148 19 5

VALENCIA.

1911.		1912.
£ s. d.		£ s. d.
—	Royal Society (magnetic observations)	41 15 5
17 10 0	Grazing Rent	17 10 0
334 10 5	To Balance	344 2 6
£352 0 5		£403 7 11

1911.		1912.
£ s. d.		£ s. d.
206 5 0	Superintendent	206 5 0
92 0 0	Assistants	90 16 3
—	Magnetic observations	36 0 0
12 14 1	Rent, rates, and taxes	19 15 4
—	Private wire	13 5 0
41 1 4	Miscellaneous expenses	46 6 4
£352 0 5		£403 7 11

Submitted—The following statement :

	£	s.	d.
Bank balance on 30th November, 1912	2,748	9	2
Receipts from 1st December, 1912 to 28th February, 1913 ...	5,752	15	9
	8,501	4	11
Cheques drawn from 1st December, 1912 to 28th February, 1913	6,471	13	1
Bank balance on 28th February, 1913	2,029	11	10

1913–1914.

(Ninth year of the Meteorological Committee.)

FORTY-EIGHTH MEETING.

South Kensington, S.W., 30th April, 1913.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW. | CAPTAIN LYONS.

391. The Minutes (382–390) of the last meeting (12th March, 1913), were read and confirmed.

392. CORRESPONDENCE.—**Daily Report for The King.**—Reported—the following letter (1,775/2) from Lt.-Col. Sir F. E. G. Ponsonby (*see* Minute 260) :—

Buckingham Palace,
25th April, 1913.

SIR,

I BEG to acknowledge the receipt of your letter of the 21st inst. and to thank you for your kind offer to supply me with information regarding the prospects of the weather on Monday next the 28th. I will communicate with you by telephone about 9 a.m.

Regarding the suggestion contained in the latter part of your letter, I am commanded by The King to tell you that His Majesty would be very glad to have a copy of the Daily Weather Report sent to him regularly. His Majesty has always taken a great interest in the chart and details concerning the barometer ever since he was on board H.M.S. "Thrush." The King would therefore be pleased to receive your daily report and desires me to ask you to be good enough to address it direct to him every day.

Yours truly,
F. E. G. PONSONBY.

William N. Shaw, Esq., LL.D.,
The Director,
Meteorological Office,
South Kensington, S.W.

Meteorological Committee (Minute 383).—Read—the following letter (1,503) from Lady Darwin :—

"Carmania,"
1st April, 1913.

DEAR MR. SHAW,

MAY I ask you to be so good as to thank the members of the Meteorological Committee, on behalf of myself and my family for their kind expressions of sympathy which you have conveyed to me.

We much appreciate the terms in which Their Lordships at the Treasury have conveyed to you their acknowledgment of my husband's worth to the meteorological service.

I remain,
Yours very truly,
MAUD DARWIN.

Forecasts.—Reported—the following letter (1,723) from the Dorset County Chamber of Agriculture, and reply (*see* Minute 389) :—

Dorset County Chamber of Agriculture,
5, South Street, Dorchester,
19th April, 1913.

DEAR SIR,

THE farmers in some of the districts of Dorset, who owing to the exigencies of the postal service, do not receive their daily papers till mid-day, are agitating for some scheme by which they can get the reports of your Office at such a time as to make them practically available. It would appear that the only means is by telegraph to the nearest Post Office, for which, I gather, they would have to find the cost themselves. At a meeting of the Dorset County Chamber of Agriculture next Saturday the matter is to be brought up and ways and means discussed.

I should be very much obliged if you would inform me whether the Post Office Department has been approached on the matter, and if so, whether they have made any offer or suggestions to facilitate the service. I gather that the farmers would prefer the inferences published in the evening if they could have them either the same night or early the next morning.

I am, &c.,
HERBERT TILE
Hon. Sec

Dr. W. N. Shaw,
Meteorological Office,
Kensington, S.W.

DEAR SIR, 21st April, 1913.

I AM interested to hear that the farmers in some of the districts of Dorset are agitating for some scheme by which they can get reports from this Office by telegraph.

In reply to your question I may say that the Post Office department have been approached on the matter and are always willing to grant any facilities within their power, such as allowing the local officials to put up the forecast telegrams in the Post Office, and to accept special reply-paid telegrams for forecasts, and so on. But on the question of finance they always have been, and still are, guided by the principle that meteorological telegrams must be paid for as ordinary messages: that is to say at the rate of 6*d.* for 12 words for each telegram delivered at any Post Office, with two-pence for a duplicate or second message at any Post Office, in addition to the address of the copy. To a certain extent this condition is intended only as a matter of book-keeping, so that the whole expenditure upon the meteorological service may be shown under the Meteorological Office Vote, but it naturally places an Office which depends upon a fixed grant in a difficult position.

I think we could arrange that evening messages could be sent out sufficiently early to reach the local Post Offices before closing time in the evening.

Possibly the extension of the telephone may in course of time lead to greater development of facilities for receiving these messages in the country.

I am, &c.,
W. N. SHAW.

Herbert Till, Esq.,
Hon. Secretary,
Dorset County Chamber of Agriculture.

393. ESTIMATES FOR 1912–13 (Minute 384).—**Scottish Meteorological Society.**—Submitted—the following report:—

SCOTTISH METEOROLOGICAL SOCIETY.

In accordance with Minute 384 and the request of the Treasury (Letter 24668/12 of the 25th February, 1913) that I should confer with representatives of the Society, and that the Committee should consider whether from the increased grant placed at their disposal they could not find the funds necessary to place the finances of the Society on a satisfactory footing, and arrange for a closer co operation between the work of the Society and that of the Meteorological Office, I visited Edinburgh on 17th March, 1913, and, after preliminary conversations first with Mr. E. M. Wedderburn, W.S., Honorary Secretary of the Society, and subsequently with Mr. W. B. Wilson, W.S., Treasurer, Mr. James Watt, W.S., member, and Mr. Andrew Watt, Secretary, I met a committee appointed by the Society at the office, 122, George Street, on 18th March, 1913. The members of the Committee present were Professor C. G. Knott, in the chair; Professor R. A. Sampson, Astronomer Royal for Scotland; Mr. E. M. Wedderburn; Mr. Wilson; Mr. A. Watt.

It appeared from the correspondence forwarded by the Treasury that the essential basis of the claim for an increased grant from public funds, put forward by the Society and supported by the Registrar-General and the Secretary for Scotland, was that in carrying out the meteorological work for the Registrar-General (including that done for the Meteorological Office) the Society was doing work for the public service, and that it should be paid for out of public funds, so that "no part of the Society's income derived from subscriptions should be diverted from its primary purposes of giving encouragement and direction to scientific research, and of meeting the cost of preparing and publishing research papers of educational value."

Accepting this principle for the proposed addition to the Society's funds, combined with closer co-operation between the work of the Society and that of the Meteorological Office it follows:—

(1) That a distinction must be drawn between that part of the work of the Society which is done for the public service, and that part which is done in furtherance of what are called its "primary purposes."

(2) That in so far as the cost of the former is paid out of public funds there ought to be a formal report to a public authority setting forth the work that is being done, and there ought also to be provision for its reconsideration from time to time without trenching upon the freedom of the Society in respect of its primary purposes.

The work done for the public is most conveniently described as that of a Meteorological Office, and in that way can be distinguished from the work done by the Society in respect of research and its publication.

Hence, it seemed appropriate to indicate the meteorological work done in Edinburgh for the public service as the work of the Meteorological Office, Edinburgh, to place the work under the control of a Committee consisting mainly, but not exclusively, of nominees of the Society, and to place at the disposal of the Committee all the facilities which could be provided by the Society with the sums contributed by Government in consideration of the work.

With that understanding, after consultation with Mr. Wedderburn, a schedule of regulations for a Meteorological Office in Edinburgh was considered at the Conference and adopted, in the form which follows:—

Regulations for Meteorological Office, Edinburgh.

(1) The objects of the Office are:—

(i) The collection of trustworthy meteorological statistics from municipal and voluntary stations in Scotland and the preparation of summaries for the meteorological reports issued by Government, and for the statistical reports of the Registrar of Births, Deaths, and Marriages for Scotland.

(ii) The supply of meteorological information in reply to inquiries.

(iii) The promotion by all available means of public technical instruction in meteorology and of the applications of meteorological science in the interests of the public health, of agriculture, fisheries, and other industries.

(iv) The promotion of meteorological researches, including researches on an international basis, which depend on the organisation and compilation of observations.

(2) £100 a year [is now] paid to the Society by H.M. Treasury on account of the Registrar-General for Scotland. [In addition to this sum] the Meteorological Committee will allocate from the grant placed at their disposal by Parliament a sum of £350 for the service of the Edinburgh Office, which will be paid to the Society in quarterly instalments by the Meteorological Committee.

(3) The grants will be administered by a Committee consisting of :—

The Director of the Meteorological Office.
One member appointed by the Board of Agriculture for Scotland.
One member appointed by the Registrar-General for Scotland.
Three members appointed by the Scottish Meteorological Society.

The Director of the Meteorological Office will preside at meetings of the Committee which he attends, and the Society will appoint one of its representatives to be chairman in his absence.

(4) The Committee will present to the Meteorological Committee a report of the work done by the Meteorological Office, Edinburgh, to be incorporated with its Annual Report to the Lords Commissioners of H.M. Treasury, and will account for the expenditure of the funds in such form as may be required.

(5) Out of the grant of £450, not less than £250 shall be applied in payment of the salary of an officer who will act as Superintendent of the Office.

(6) In consideration of the services rendered to the Society by the Superintendent and staff of the Office, the incidental expenses of the Office (viz., rent, fuel, lighting, rates, taxes, caretaking, and cleaning) will be borne by the Society.

(7) The staff of the Office will be appointed by, and be subject to dismissal by the Society.

(8) Part of the duty of the Superintendent will be to act as Inspector for the Meteorological Office, travelling expenses and subsistence allowance being paid for on the same understanding as heretofore.

(9) The Superintendent will be at liberty to act as Secretary of the Society, and to receive such stipend in addition to his salary as Superintendent as the Society may from time to time determine. He may also undertake paid work as a lecturer and contribute occasional articles to periodicals, but he may not act as the regular correspondent of a daily newspaper, nor receive payment for contributing information for copyright publication which is, or might reasonably be, part of the work of the Office in the interests of the public.

(10) Information will be compiled in the Office without charge, in accordance with the requirements of the several departments concerned.

(i) for the periodical weather reports of the Meteorological Office.
(ii) for the periodical returns of the Registrar General or other Government Department.

(11) Information will be compiled and supplied in response to inquiries from solicitors or private persons on terms similar to those in force at the Meteorological Office, London, and a similar scale of fees will be applicable for the "proof" of any evidence before His Majesty's Courts, citations for Scottish Courts being accepted by the Superintendent of the Meteorological Office, Edinburgh, for this purpose. The sums received by the Edinburgh Office for these services will be paid in to the account of the Society.

(12) For the purposes of compiling information to be produced before His Majesty's Courts in Scotland, or supplied in response to inquiries from solicitors or private persons, all records of all kinds preserved at the Meteorological Office, London, are to be regarded as available, due provision being made for their safe custody ; and with the same proviso, the Committee will, as far as possible, facilitate the supply of the information for use in His Majesty's Courts in England direct from the London Office. The original schedules for Scottish stations, other than those of the Observatories and Telegraphic Reporting Stations of the Meteorological Office, are to be stored at the Office in Edinburgh for production when required. The schedules used in the preparation of the Weekly Weather Report are to be stored in London.

(13) The Observers at Stations in connexion with the Meteorological Office, Edinburgh, will enjoy the same privileges as to the supply of instruments, forms, &c., as those in direct connexion with the Meteorological Office in London.

(14) Copies of the Monthly Report of the Meteorological Office will be supplied to the Society for distribution to its members on the same terms as those on which they are supplied to the Royal Meteorological Society, that is to say for the cost of paper, working off, and stitching, of the additional copies required.

(15) These regulations may be modified as regards the arrangements for the administration of the Meteorological Office in Edinburgh and the co-operation of that Office with the Meteorological Office in London, by agreement between the Meteorological Committee and the Scottish Meteorological Society.

W. N. SHAW.

Meteorological Office,
London, S.W.

26th March, 1913.

Submitted further the following letter (1,819) from Mr. E. M. Wedderburn, Honorary Secretary of the Scottish Meteorological Society, conveying the Society's approval of the proposals :—

Scottish Meteorological Society,
122, George Street, Edinburgh.
23rd April, 1913.

SIR,

I HAVE to inform you that, at a meeting of the Council of the Society held to-day, consideration was given to the Schedule of Regulations for a Meteorological Office in Edinburgh, which was discussed with you at the meeting of a Committee of the Council held here on 18th ult., and it was unanimously agreed to adopt the Regulations if approved by your Committee. For convenience of reference I enclose an initialed copy of the Regulations as submitted to the Council, and I shall be glad to hear from you when you have got the instructions of your Committee.

If an agreement is come to, I understand that it is intended that the Regulations should be put into working order on 1st January, 1914, but the Council suggest that the additional grant should date from 1st inst., as the Society will necessarily be at the expense of reorganising its office to meet the new conditions, and are already employing an additional assistant.

I am, &c.,
E. M. WEDDERBURN,
Honorary Secretary.

W. N. Shaw, Esq., LL.D., F.R.S.,
The Director, Meteorological Office,
South Kensington, London, S.W.

The report and regulations for the Meteorological Office, Edinburgh, were approved subject to verbal amendments indicated by the words in square brackets. It was agreed to date the grant from 1st April, 1913, and that payments of £87 10*s.* be made on 30th April, or as soon thereafter as the pleasure of the Treasury upon the proposed allocation be known, 31st July, 31st October, and 31st January for the financial year 1913–14.

The draft letter to the Treasury referred to in Minute 384, which had been held back until the negotiations with the Scottish Society were brought to a conclusion, was reconsidered, and the following letters were approved :—

933/C. 06.

8th May, 1913.

SIR,

I AM instructed by the Meteorological Committee to acknowledge the receipt of your letter 24668/12 of the 25th February, 1913, and to ask you to convey to Their Lordships the Committee's thanks for Their consideration of the representations made to Them with regard to the grant in aid for the Meteorological Office.

The Committee note that Their Lordships have asked Parliament for an inclusive grant, intended not only to meet present requirements, including the funds necessary to place the finances of the Scottish Society on a satisfactory footing, but also to provide for subsequent developments of the meteorological service. They note also the sum of £20,000 as representing the fixed grant, exclusive of any separate grant for Eskdalemuir Observatory, which will be paid to the Royal Society, and the reminder that it is not desirable to expend forthwith up to the increased total of the grant.

The Committee had the same objects in mind in preparing the estimates which were forwarded with my letter of the 6th December, and after prolonged and careful deliberation they arrived at the figure of £22,351 as representing the grant necessary to secure the objects which Their Lordships mention. This figure included the £1,000 on account of Eskdalemuir, which is to be paid through the Royal Society, and £400 for Post Office charges, which, in accordance with Treasury Letter 14285/12 of the 2nd May, 1913, will now be reduced to £100; but, on the other hand, no provision was made for an increased payment to the Scottish Meteorological Society, for which, as the result of negotiations which are the subject of another letter,* £200 has been assigned.

When adjustment is made on account of these items the Committee's estimate of the sum required to carry out the objects to which Their Lordships refer is £21,251, whereas by Their Lordships' proposal the Parliamentary grant is £20,000.

The Committee have accordingly examined again the items of expenditure, and they have estimated the distribution of the sum for the year 1913–14 as set out in the revised statement which is enclosed herewith.

Of the developments suggested in the Committee's letter of the 6th December, 1912, some have been considerably curtailed and others postponed, in order to bring the expenditure within the sum assigned. The Committee are convinced that the work of future years will be seriously crippled by the omission or long postponement of the items enumerated, and they fear they will be compelled to ask Their Lordships to reconsider the figure in the near future.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W.

* 934, C. 10, printed on the next page

METEOROLOGICAL OFFICE.

REVISED ESTIMATES for the Year 1913–14 (*see* Minutes 379, 384).

Heads of Service.	Proposed for 1913–14.	Voted for 1912–13.	1913–14. Increase.	1913–14. Decrease.
	£	£	£	£
Director	1,000	1,000	—	—
Salaries: Office	9,115	8,776	339	—
Observatories	3,343	3,336	7	—
Expenses of office:				
Rent, fuel and lighting	735	730	5	—
Repairs, furniture, and incidental expenses	470	405	65	—
Postage	660	650	10	—
Telegrams	2,740	2,475	265	—
Travelling expenses	400	340	60	—
Superannuation allowances (operative) ...	1,496	1,383	113	—
„ fund (in addition to £209 included in operative).	541	—	652	—
„ fund (contingent addition) ...	111			
Cost of instruments	2,460	2,310	150	—
Expenses of M.O. observatories	1,313	1,045	268	—
Grants, &c. to auxiliary observatories, anemograph stations, &c.	2,116	2,081	35	—
Grant for salaries, &c. of Edinburgh Office ...	350	150	200	—
Totals	26,850	24,681	2,169	—
Appropriations in aid:				
M.O. observatories: Subventions	1,462	2,380	—	697
„ Local expenses refunded	221			
„ Office expenses refunded	90	48	42	—
Departmental expenses refunded	455	435	20	—
Incidental expenses refunded	515	495	20	—
Telegraph expenses refunded	600	560	40	—
Inspections	160	—	160	—
Cost of instruments (Navy)	510	510	—	—
„ „ (other sources)... ...	1,500	1,500	—	—
Superannuation	887	800	87	—
Lectures and experiments	450	400	50	—
From balance in hand	—	553	—	553
Totals	6,850	7,681	419	1,250
Parliamentary Grant	20,000	17,000	—	—

934/C. 10.

SIR, 8th May, 1913.

WITH further reference to your letter 24668/12 of the 25th February, 1913, I am desired by the Meteorological Committee to say that in compliance with the request conveyed in Their Lordships' letter, the Director has conferred with the representatives of the Scottish Meteorological Society, and a scheme of organisation has been prepared which draws a distinction between work done in Edinburgh for supplying information to the public through the publications of the Meteorological Office or the Registrar General for Scotland or otherwise, and the work done for the primary purposes of the Society in respect of research. On the principle laid down by the Society and endorsed by the Registrar-General and the Secretary for Scotland, that the costs of the former ought to be met out of public funds, it is proposed to place the control of that work in the hands of a separate Committee, with provision for the representation of the interests concerned, and to organise the supply of information to the public from the Meteorological Office in Edinburgh on lines similar to those of the Office in London.

Under the proposed scheme the traditional payment for schedules of observations compiled in the Society's office and supplied for publication in London will be merged in an inclusive grant of £350 from the Meteorological Office vote which, with the £100 paid direct, will provide £450 a year for the maintenance of an office staff for the supply of information to the public in Edinburgh. The proposals will then provide for the effective co-operation of the Society with the Office in the consideration of the work to be done and the form in which the results should be issued.

The proposals have been approved by the Scottish Society, and a long-standing obstacle to the progress of meteorological science has been removed. They have now been approved by the Meteorological Committee in the form in which I have the pleasure to enclose. I am to ask you to thank Their Lordships for providing this opportunity of coming to an amicable agreement upon a matter which has for a long time been a difficult subject.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W.

[The regulations which were enclosed are printed on pp. 270, 271—"*Regulations for Meteorological Office, Edinburgh.*"]

394. Office Staff.—Reported—the following promotions as from 1st April, except where otherwise stated :—

Office :

Mr. A. A. Lovie, to a fourth-class clerkship in the Marine Division from 1st January, 1913. (Order 228.)

Mr. A. R. Simpkins, to a second-class clerkship in the Statistical Division.

Mr. A. T. Bench, to a third-class clerkship in the Forecast Division.

Mr. W. Hayes, to be classed as clerk assistant. (Order 239.)

Kew Observatory :

Promotions are deferred until the introduction of new regulations on the removal of the testing work to Teddington. (Order 239.)

Eskdale Observatory :

Mr. W. C. Parkinson, to be classed as clerk assistant with a commencing salary of £125, on the transfer of Mr. A. E. Gendle to the Office.

Mr. G. Harris, to a staff clerkship, with commencing salary of £75, together with rooms equivalent to £13 a year, in addition, on leaving Kew to take up duty at Eskdale. (Order 239.)

Mr. M. T. Spence, to be classed as clerk assistant from 1st April on completion of his 20th year in January last. (Order 241.)

Reported—the following appointments :—

C. F. J. Jestico, born 18th June, 1896, and W. B. Greening, born 27th August, 1896, to be probationers on the usual terms in the Forecast and Marine Divisions respectively, from 2nd December, 1912. (Order 224.)

H. H. H. Colbon to be boy messenger from 20th January, 1913, at 7*s.* 6*d.* a week, with an increase to 10*s.* a week after six months' satisfactory service. (Order 231).

A. C. Roddam, born 1st August, 1897 ; L. G. Hemens, born 20th July, 1897, and P. F. Aburn, born 6th June, 1897, to be boy clerks upon Civil Service terms. The hours of employment are seven a day (four on Saturday) ; the pay is 15*s.* a week during the first year, with overtime at 4½*d.* an hour if employed beyond 7½ hours. They are assigned respectively to the chief clerk's staff, to the Kew Observatory, and to the section dealing with the meteorology of the globe. (Order 241A.)

Miss E. V. Turney to be photographic assistant in place of Miss E. Humphreys, resigned, at a commencing salary of £60, rising by £7 10*s.* a year to £100, of which £10 per annum is to be regarded as deferred pay. (Order 243.)

Reported—that W. C. Parkinson, clerk assistant at Eskdalemuir had been offered and accepted an appointment in connexion with the Carnegie Institution of Washington, and wished to be released from duty at Eskdalemuir as from 31st May, and to take holiday from 14th May.

It was agreed that he be released from duty on 31st May, and that leave could only be granted subject to the convenience of the Observatory, at the discretion of the Superintendent.

Superannuation.—It was ordered that if W. Tomkins's appointment be continued after the end of the present financial year, he should be brought under the Superannuation Provision for Supernumerary Clerks. (Circular 002, par. 20.)

395. M.O. Observatories.—**Kew.**—Dr. Shaw attended, at the request of the Director, to discuss the draft regulations for the Observatory set out in Minute 385, and made representations upon various points.

Eskdale—*Furniture, fittings, &c.*—Read—a letter from Mrs. L. F. Richardson, giving details of proposed repainting and decorating for the Superintendent's house.

The reference of the matter to the Office of Works, Edinburgh, for an opinion as to what expenditure was necessary, was approved.

It was agreed to take over from Mr. A. E. Gendle, for £17 10*s.*, a piano, as part of the furniture of the assistant's house, on the terms set out in Departmental Minute E.K. 28 (C. 44).

Read—letter 1,315 (C. 44) from Dr. Harker, offering at cost price the motor car, a 1908 De Dion, 10 h.p., two cylinders, two seater, with dickie seat, which he had purchased for £110 in January, in preparation for his stay at Eskdalemuir, and which had

proved serviceable, even in snowy weather. Also—letter 1888, from Dr. Harker, on the same subject, containing the following estimate of a year's cost of running the car :—

	£	s.	d.
Petrol at 1s. 9d.	10	10	0
Tyres and tubes	13	0	0
Oil and grease...	3	10	0
Repairs and sundries	6	0	0
Insurances	8	0	0
Licenses	3	8	0
	£44	8	0

It was agreed to consult Dr. Schuster on the subject.

396. Auxiliary Observatories.—**Falmouth** (Minute 386).—Submitted—the following memorandum :—

Falmouth Observatory.

1. Looking back on the Meteorological Organisation of the last 50 years it will easily be admitted that its most obvious defect is its rigidity as regards observations and personnel and the want of a graded staff of workers with preliminary scientific training.

2. The original idea of 1868 seems to have been the concentration in London and Kew not only of co-ordination of effort but of scientific discussion for the resolution of various problems presented by the daily weather. It should be understood that in a public meteorological organisation it is the daily weather which asks the questions to which the scientific staff have to find answers by means of researches, not necessarily of immediate and direct application but always with that ultimate object more or less in view.

3. According to the original idea, seven observatories were established with a rigid programme, reporting schedules of observations weekly to Kew, and ultimately to the Office for discussion there in relation to the facts of the daily weather which were reported directly to the Office from a set of stations of which only two, Aberdeen and Valencia, were located at the Observatories, so that any connection between the observatory work and the weather was a matter for consideration only at the Office and long after the events had transpired.

4. The meteorological work was for the most part entrusted to institutions which had other objects mainly in view ; at Aberdeen, Stonyhurst, Glasgow, and Armagh Astronomy was the principal object, at Falmouth the observatory formed part of the activity of the Royal Cornwall Polytechnic Society, at Kew Meteorology in time became subordinate to Terrestrial Magnetism, only at Valencia was a separate observatory established. Thus the work at the observatories was generally in charge of a subordinate official, who had no prospect of promotion either in the institution to which he was attached, or in the London Office, where the staff, with the exception of the Director or Secretary and the Marine Superintendent, was also a staff of similar subordinate officials without specific scientific training, and with no experience of observatory work or of instruments.

5. In the course of the fifty years a number of anemograph stations have been established for recording the velocity and direction of the wind, which are closely related to the facts of the daily weather ; moreover sunshine stations and climatological stations of different orders have been established in all parts of the three kingdoms by municipal authorities and amateur meteorologists, which supply a great body of information about the weather to the Office but are not related to the observatories.

6. Meanwhile, the heads of the institutions which maintained the observatories have regarded themselves as exonerated from any obligation to keep in touch with the evolution of meteorology as a separate science directed to the solution of definite problems under the guidance of international co-operation. They have been satisfied if they discharged their obligations as interpreted by an inspector sent from Kew.

7. Hence there has grown up an elaborate and far-reaching system for the collection of data on a rigid plan with the idea that the Central Office will provide the brains and time necessary to convert the collection of meteorological data into progress in meteorogical science.

8. The system thus established has the advantage as well as the defects of rigidity. For one thing, it is economical, and one cannot expect the Treasury to give effusive support to proposals which increase the expense without apparently altering the relation of the organisation with the public. But the economy is dearly bought if it means a delay of a generation in finding answers to meteorological questions of public importance. Hence it is desirable to use any opportunity within the resources of the organisation for putting things on a more productively scientific footing.

9. Taking the posts set out in the Regulation for Appointments at the Meteorological Office, the paid staff of the Office at present is as follows :—

Senior Staff with permanent appointments.

Director.
Six Superintendents (for the four divisions of the office and two observatories).
Three Meteorologists (Valencia, Pyrton Hill, and South Farnborough).
One Seismologist (Eskdalemuir).
Three Forecasters at the Office.

Junior Staff with provisional appointments.

Professional assistants—none.
Graduate assistant—one at the Office.

[In addition we may reckon the assistant at Aberdeen under Professor Niven, who takes a keen interest in meteorology. One of the assistants at Oxford has recently contributed a paper to the Royal Meteorological Society.]

10. Three vacancies in the senior staff will occur under the age limit within the next five years. It is obvious that the existing junior staff is inadequate ; provision has already been taken to appoint three professional or graduate assistants, one for South Farnborough, one for Kew, and one for the Office.

11. The present provision for Falmouth observatory comes to an end on June 30th. The appeal for support of the magnetic work of the observatory has met with no response from the British Association, consequently it must be concluded that the magnetic work ought not to be continued at the public expense ; the resources available for the observatory will be reduced to the Meteorological Office grant of £250 a year. A few pounds in addition are available if the necessity for sending an inspector is obviated. The observatory house and grounds, worth about £50 per annum (cost £1,610, rated house £24 gross, £19 5*s.* net, and observatory, gross £10, net £8), belong to the Royal Cornwall Polytechnic Society.

12. For an effective observatory on modern lines, the staff required would be a superintendent, professional assistant, clerical assistant, attendant, and for these with instruments and incidental expenses £1,000 a year would be required.

13. Such a sum is beyond the resources of the Meteorological Office, but there is sufficient to pay the salary of a meteorologist. At the present time the observations from Falmouth are not used in the daily report and it is hardly necessary to have a telegraphic station there ; there is a good telegraphic station at Scilly within 60 miles, and the Corporation station at Newquay on the North Coast of Cornwall at present sends voluntary reports by telegraph.

14. There is a pressure tube anemograph at Pendennis Castle which would be sufficient for the locality if it were provided with recording gear for direction as well.

15. The observations of maximum and minimum temperature, rainfall and sunshine are used for the weekly report and ought to be continued.

16. It appears that the Corporation of Falmouth has a climatological station. Particulars as to site, &c., are not yet known, but it is obviously an advantage for work of that kind to be carried on by the Corporation. Supposing this could be arranged, a meteorologist could profitably occupy himself with observations of clouds, pilot balloons and other experimental work, but he need not be definitely tied to the immediate locality. He could spend part of his time at Scilly and part at the office, and act as inspector for the office. He would thus qualify himself for promotion to other appointments.

17. Besides the instrumental equipment for his experimental observations he would require a barograph, thermograph and hygrograph. The post ought not to be regarded as one for a married man, and hence he would have to find quarters in lodgings.

18. Having regard to the history of the Observatory, it would seem desirable for the meteorologist to make his head quarters there, and thus continue the traditions of the place, for the immediate future at any rate, if the Royal Cornwall Polytechnic Society would agree and would see about the domestic arrangements.

19. These proposals work out as follows :—

1. That negotiations be opened with the Falmouth Corporation with a view to their undertaking the climatological work, including the sunshine record.
2. That the anemograph at Pendennis Castle be replaced by one which records both direction and velocity.
3. That an additional assistant meteorologist for experimental observations be appointed on the Office staff, and that he, with a salary of £150 rising to £200, and the graduate assistant in the forecast division in turns be quartered for the time being at Falmouth. That he be in general charge for the Office of the meteorological work in Cornwall and Scilly, and that he be available for work at other centres when ordered.
4. That the Royal Cornwall Polytechnic Society be invited to make arrangements for the meteorologists' quarters to be in the present Observatory building.

It was agreed to communicate paragraphs 11 to 19 to Falmouth, and to authorise a visit to Falmouth, in order that the proposals of paragraph 19 might be discussed on the spot with a representative of the Royal Cornwall Polytechnic Society.

Stonyhurst.—Reported, that on the termination of the agreement for the subvention of £56 on 31st March, 1913, the Rector of the College had agreed to continue the supply of the returns for the Weekly Weather Report. (See Minute 345.)

397. Stations.—**Daily Weather Service.**—Reported—that a letter (1706) had been received from the Manager of the Hull Steam Trawlers Mutual Insurance and Protection Company, Limited, asking the Office to take into consideration the need for the inclusion in the Daily Weather Report of a station further North than Bodö, in view of the large number of fishing vessels voyaging to the Behring Seas nearly all the year round. Vardo, in Varanger Fjord is suggested in the letter as a place from which information would be useful. The Director of the Norwegian Meteorological Service has been asked whether he can arrange to supply information from this station.

Stations of the Ordnance Survey Department.—Reported—the following letter from Colonel C. F. Close (1719), respecting the supply of meteorological instruments and the maintenance of meteorological observations at the establishments of the Ordnance Survey Department.

Ordnance Survey Office,
Southampton,
19th April, 1913.

SIR,

WITH reference to your letter No. S. 3/0096 (2) to the Officer Commanding the Irish Division of the Ordnance Survey, on the subject of the cost of the provision and repair of the meteorological instruments in use at the Ordnance Survey Offices at Shrewsbury, Southampton and Dublin, I have to make the following observations :—

The meteorological instruments at Shrewsbury were paid for by, and are kept in repair at the cost of the town authorities.

The cost of renewal and repair of the meteorological instruments at Southampton has since 1908 been defrayed by the Ordnance Survey. But it appears to be a questionable charge against the Survey Vote, and I should be glad to know if the Meteorological Office is prepared to meet such expenses in future.

The instruments at Dublin have been lent by your Office, and, with regard to the suggestion that this Department should now purchase them, I regret to inform you that I could not justify any such charge against the Ordnance Survey Vote.

I would point out that the observations taken and the reports furnished are primarily for the information and use of your Office and the public, and are not required for Ordnance Survey purposes. The Ordnance Survey provides the labour for taking the observations and preparing the returns, free of cost to and for the benefit of your Office.

I am, &c.,
C. F. CLOSE, Colonel,
Director-General.

The Director,
Meteorological Office.

The Director was authorised to set out in reply the conditions under which the Office accepted the responsibility for the maintenance of stations, and the relation to the Office organisation of stations maintained by other persons and institutions. The following reply was sent on 22nd May :—

SIR,

22nd May, 1913.

I HAVE delayed replying to your letter C/C 1930/13 of the 19th April, because it raises a general question of some interest, and until now I have not found an opportunity of setting out the considerations which I think ought to guide its decision.

The suggestion of your letter that the observations made by the Survey Department are primarily for the information and use of this Office, leads to the general proposition that all records of weather in the three kingdoms are made on behalf of this Office, and this is, I think, a serious misapprehension.

It is no doubt true that this Office exists for the sake of meteorological observations of all kinds, but the converse proposition that all meteorological observations are maintained for this Office must, on reflection, be acknowledged to be an exaggeration.

It seems to me to be the obvious duty of every locality to maintain such observations of weather as are desirable for local purposes. The medical officers, health committees, surveyors and engineers of many county boroughs already find it desirable to keep trustworthy records of the weather, and indeed, I can scarcely understand how they can carry out their duty effectively without such records. So far, the county authorities are rather more backward than the county boroughs, but looking forward, perhaps many years ahead, I cannot think that local administration will be regarded as fully organised unless there is a rainfall record for each parish, a temperature record for each district, and a climatological station for each county and county borough.

You will I think agree with me that it would not be reasonable to regard the central meteorological institution as responsible for the maintenance of this network of statistics. It is obviously not its duty to supply local authorities with information which can only be obtained locally. It has of course certain duties in regard to observations necessary for the daily study of weather and its interpretations, the sequence of seasons, the secular variations of climate, and other questions which only a central organisation can properly perform, but these duties require only a strictly limited number of observatories and stations, and these are, or will be provided and maintained.

The duty of the Office with regard to other stations maintained by Government institutions, local authorities, and private persons, is to act as the guardian of the public memory, and to make the information which has been obtained in the first instance for local purposes available as far as possible for the information of the general public, so that any member of the public can have access, with the least possible difficulty, to any record of the weather that exists in any part of the country. This duty we endeavour to carry out by acting as expert advisers to secure properly comparable observations, by organising the supply of suitable instruments, by forming a depository for copies of the records which observers are good enough to send us, and by publishing summaries which serve as an index to the whole body of information which we possess. I enclose a copy of the Annual Summary for 1912, which will illustrate what I mean. I have marked those stations which we find it necessary to maintain for the purposes of the Office. You will see that the principle laid down in your letter is already susceptible of a very wide application, and would extend the responsibility of the Office for the maintenance of stations far beyond its present scope.

In confirmation of the view which I have here put forward, I think I may say that the meteorological observations of the Ordnance Survey, and indeed of the Royal Engineers generally, go back to a period anterior to the institution of this Office. I think we owe the first draft of instructions for taking meteorological observations to a Director of the Ordnance Survey. Apart from the general principle that every county borough must require a trustworthy record of the weather, I am afraid I am unable to say whether observations at Southampton, Shrewsbury, and Dublin, are specially necessary for local purposes, and, of course, I can have nothing to say as to whether they are necessary for your own purposes. As regards Southampton, I can only say that Liverpool does find it desirable to maintain a meteorological observatory, and in that case it is the Mersey Docks and Harbour Board which shoulders the burden. Greenwich does the same for London; Glasgow has an elaborate system of its own besides the University Observatory; the Office of Works at Kingstown keeps an anemometer, and so on.

If you should decide to abandon the observations at Southampton, which I should consider most unfortunate considering the length of time over which they have already been maintained, I should consider myself precluded by the terms of the Parliamentary Grant from initiating observations there at the expense of the Office, but I should certainly represent to the local authority the urgent necessity for a port of such importance to provide itself with proper records of the weather; and again, with regard to Dublin, we already have observations from the Botanic Gardens, from Trinity College, and from a highly competent private observer, Sir John W. Moore, M.D., but the two stations last mentioned at any rate depend upon a less secure foundation than the interest of the local authority in weather, which must not only persist but increase.

Before going further I shall be glad to know whether you concur in this view of the general question. Naturally I consider a station in charge of the Ordnance Survey exceptionally good from the point of view of accuracy and permanence, and therefore I should be sorry to see them given up. Of that the locality gets the immediate advantage. This Office cannot properly be regarded as responsible for instruments except on the general principle that the Meteorological Office is the department responsible for the supply of meteorological instruments, and that they can be indented for in the same way as furniture can be requisitioned from the Office of Works.

Unfortunately their Lordships do not permit us to keep our accounts in that way. It is their pleasure that we should work on a fixed grant, so-called "in aid," and as we have to pay the Office of Works for our furniture, we have to expect other departments to reimburse expenditure made on their behalf.

I am, &c.,
W. N. SHAW.

The Director-General of the Ordnance Surveys,
Southampton.

398. ANNUAL REPORT.—It was agreed that the Eighth Annual Report should be prepared on the same lines as heretofore, but reduced in size by the omission of appendices, or otherwise.

399. DIRECTOR'S REPORT AND ACCOUNTS:—

Meeting of the International Meteorological Committee at Rome (Minute 370).—Meetings were held at the Meteorological Institute, Rome, on Monday, April 7 to Saturday, April 12. The Director, president of the Committee, with Mr. Lempfert, attended on behalf of the Office, and there were present besides Dr. Hellmann (Prussia), Secretary; Messrs Angot (France), Chaves (Portugal), Van Everdingen (Holland), Hamberg (Sweden), Maurer (Switzerland), Palazzo (Italy), Ryder (Denmark), Rykatcheff (Russia), Stupart (Canada); Hergesell, President of the International Commission for Scientific Aeronautics; and (by invitation of the President) Bjerknes, Professor at the Geophysical Institute, Leipzig.

The official report will be issued in German, as soon as possible, by the Prussian Office. In the course of the meeting MM. Hamberg and Rykatcheff took leave of the Committee on the resignation of their offices, and the resignations of MM. Mohn and Willis Moore were intimated as impending, so that there will be at least four vacancies to be filled before another meeting of the Committee. As the meeting in question was the third since the Conference of Directors of Institutes and Observatories held at Innsbruck, in 1905, the meeting decided that it was desirable to convene another conference to be held in the year 1915. No conclusion was arrived at as to the place of meeting, but one of the towns in the Netherlands, The Hague or Amsterdam, was suggested.

Fishery Barometers.—Reported—that the Fishery barometer supplied to the Lloyds' signal station at the Calf of Man, in October, 1899, had been lost on the suspension of the station in 1902, in the absence of any instructions as to its disposal. 2332/1902, 467/1913 (Case B).

Ice Scout (Minute 390).—Reported—the following, received from the Board of Trade:—

ICE OBSERVATION VESSEL.

Report of the proceedings subsequent to the termination of the Conference on the above subject.

On receiving the Report of the Conference, the Board of Trade at once approached the Treasury with a view to obtaining their consent to pay half the cost of the experimental expedition which it was proposed to send out during the spring of 1913. When the Treasury had sanctioned this payment, the Board communicated with the Liverpool Steamship Owners' Association, and ascertained that the principal North Atlantic Steamship Lines (including the foreign lines) were prepared to pay half the cost. The contribution of the various Lines will be based on the number of their North Atlantic West and East-bound sailings during the time that the Ice Observation Vessel is in commission. A list of the Lines participating is annexed.

A Committee to select the most suitable vessel for an Ice Scout was appointed, consisting of Captain Hepworth, Captain Monro and Captain Young (representing the Board of Trade), and Captain Bartlett, Marine Superintendent of the White Star Line, and Captain Dodd, Marine Superintendent of the Cunard Line (representing the Shipowners).

As it was not found possible to charter a steamer of the size desired, this Committee inspected the "Discovery," "Scotia," "Diana" and "Morning." The two latter required extensive repairs and alterations before they could possibly be put in commission. The hull and engines of the "Discovery" appeared to be satisfactory, and as a ship the "Discovery" was thought to be suitable for the work; but the accommodation for both officers and crew was inadequate and would have to be considerably extended.

The "Scotia" appeared to be the most suitable ship. The accommodation for officers, crew and Marconi operators was practically complete, and, taking everything into consideration, the time to get ready, the cost of alterations, &c., the Committee unanimously agreed that the "Scotia" should be chartered. The "Scotia" is a whaler of 357 tons gross which was formerly employed on the Scottish Antarctic Expedition. She has a speed under steam of about 7 knots and with a fair wind she can make about 10 knots under sail.

This Committee also drew up sailing directions for the master, a copy of which is attached. The code for transmitting wireless messages from the "Scotia" was drawn up by Captain Hepworth. This code gives information as to :—

(1) The kind of ice observed.
(2) The position of the ice when last determined.
(3) The direction and rate of its drift when known.
(4) The direction and force of the wind.
(5) The state and velocity of the current.
(6) Weather or state of sky at a fixed hour.
(7) Barometer and air temperature.
(8) Barometric change and sea temperature.

The arrangements for chartering and fitting out the "Scotia" were undertaken by the White Star Line on behalf of the shipowners; and their representative, Mr. Boumphrey, has had the assistance of the Board of Trade Surveyors in Leith and Dundee in carrying out this work. Captain Young also supervised the work during the last ten days before the vessel sailed and Sir H. Llewellyn Smith and Captain Monro paid visits of inspection to the vessel on the 4th and 6th March respectively.

The "Scotia" was chartered by the White Star Line for £750 per month, for a minimum period of three months. According to the terms of the charter the owners agreed to put the vessel in good repair, pay the insurance premium and provide a master and pay his wages. The master of the vessel is Captain Robertson who was in command on the Scottish Antarctic Expedition in 1903 and has since been master of the vessel when engaged in whaling. As it was understood that Captain Robertson's wages amounted to £200 a year (this being the usual wage for a whaling master who also receives about the same amount as his share in the proceeds of the catch) it was agreed that, subject to everything going satisfactorily as far as he is concerned during the time the "Scotia" is in commission, he should be allowed a bonus on his return to England at the rate of £10 per month. The risk of damage to the vessel by ice is not covered by the insurance policy and is borne by the Board of Trade and the Steamship Lines jointly. The value of the ship is stated by the owners to be £6,000.

The list of the crew of the "Scotia" and their wages is annexed. Three members of the crew failed to join at the last minute, one additional man was engaged on board on the morning when the vessel sailed, so that there were two men short altogether. Great difficulty was experienced in obtaining a third mate who had a certificate and possessed sailing ship experience. Finally a local man was obtained.

The Scientific staff of the vessel consists of :—Mr. Matthews, Assistant Director of the Marine Biological Association in Plymouth; Mr. Taylor, Schuster-Reader in Meteorology in Cambridge; and Mr. Crawshay, also of the Marine Biological Association in Plymouth, who will act as Hydrographer, Meteorologist and Biologist of the Expedition respectively.

Fitting out the "Scotia."

The work of fitting out the "Scotia" was put in the hands of the Dundee Shipbuilding Company on the basis of time and material, plus 10 per cent. profit, plus 12½ per cent. establishment charges. The vessel was put into dry dock on the 20th February and came out of dry dock on the 28th February, from which date the charter of the ship commences.

The rudder post was found to be very defective between the upper brace and the propeller, necessitating considerable repairs and detention of the vessel in dry dock. In addition, one of the pintles had to be renewed. There are four anchors on board and 195 fathoms of $1\frac{3}{16}$ in. stud link chain. These were examined and found to be in good order. The engines and boiler were inspected by a Board of Trade Surveyor, who found them in good condition, only minor repairs and adjustments being necessary.

The vessel was provided with two whaleboats carried out-board in way of the poop, and two lifeboats in addition were provided carried forward of the main rigging. To support these lifeboats a platform, which extends from side to side of the ship, was erected. Two new pairs of davits were also provided. The boats are equipped in accordance with the new life-saving appliances regulations. There are 37 life-jackets and six lifebuoys on board.

The crew spaces are situated in the 'tween decks forward, and have been altered so that there is a separate room for the petty officers. The crew's galley is situated in the forecastle. Immediately aft of the crew space on the starboard side there is a laboratory specially provided to enable chemical analyses to be made, it being essential for this purpose that the temperature should be as even as possible.

A deck-house has been placed forward of the main hatch. This is fitted up as galley, pantry, and laboratory. Access to the laboratory in the 'tween decks is obtained by a hatch and ladder-way from the laboratory above. The galley in the deck-house is used solely for cooking for the saloon.

The master, three scientists, three officers, two engineers, and two Marconi operators are all berthed in the poop. A small pantry, containing a hot-press, and a cabin for the Marconi apparatus (including a silence chamber) are also fitted there.

In accordance with arrangements made at a meeting in Liverpool between the White Star Line and the master and owner of the "Scotia," Mr. Kinnes (the owner) submitted to the White Star Line lists of outfit and stores required in deck, engine, and steward's departments, on the basis of a five months' voyage, with quotations so far as he was able to obtain the same.

Coaling was commenced on the 28th February, when the vessel came out of dry dock, and was completed on the afternoon of the 5th March. The coal is stored in bunkers, tanks in the lower hold, and in bulk in the 'tween decks amidships. It was anticipated that it would be possible to ship about 300 tons of coal, but owing to the vessel being nearly down to her marks it was not considered advisable to place more than 167 tons 15 cwts. of coal on board. The freeboard of the vessel is 3 ft. 6½ ins., and when she sailed she was 2½ ins. light of her winter North Atlantic mark, this being deemed desirable in order to make her easy in a sea way.

Two inclining experiments were carried out :—

(1) On the 28th February, at 5.30 p.m.
Vessel in light condition, with 34 tons of water in the fresh water tanks.
Mean draught, 13 ft. 0½ in.
Displacement, 722·5 tons.
Metacentric height, 12½ ins.

(2) On the 6th March, at 1.30 p.m.
Vessel in load condition, with coal, stores, and provisions on board.
Mean draught, 15 ft. 7¼ ins.
Displacement, 938 tons.
Metacentric height, 1 ft. 7⅞ ins.

In order to provide electricity for the Marconi apparatus, two dynamos were fitted in a new dynamo-room situated on the starboard side of the vessel immediately forward of the engine-room bulkhead. Access to this room is obtained from the 'tween decks and also from the engine-room over the top of the boilers. Great difficulty was experienced with one of the dynamos, which could only be made to excite by running it at an excessive speed. The other dynamo, which is rather smaller, will be the one in general use, the larger one acting as a standby. The vessel is fitted with electric light throughout. Morse signalling lamps are also provided at either side of the bridge.

The vessel is fitted with a Marconi wireless installation having a long range, so that she will be able to keep in touch with wireless stations on the coasts of Newfoundland and Labrador. The apparatus has been provided free of charge by the Marconi Company. The span between the foremast and mizzenmast is very small, so the aerial was carried to the end of the bowsprit to increase its length. Even with this addition the aerial is short, its length being about 200 feet. The Marconi apparatus had to be specially made for the vessel, and did not reach Dundee until the morning of 5th March. Thanks, however, to great exertions on the part of the superintendent-engineer of the Marconi Company, the apparatus was satisfactorily fitted and tested before the vessel sailed. The time signal from the Eiffel Tower at midnight on Friday, 7th March, was received, and signals were also picked up from the station at Poldhu, Cornwall. A test was arranged with H.M.S. "Venus," lying in the Firth of Forth, on the morning the vessel sailed. The "Venus" reported the signals as strong and clear. The distance between the two vessels was only 55 miles, but owing to the absence of wireless stations on the East Coast of Scotland it was not possible to test the apparatus at greater range.

An electric motor is fitted on the poop for use in connection with a kite apparatus kindly lent by Mr. Dines. The kites will be flown from the mizzen-truck if a suitable opportunity occurs. Dr. Assmann, Director of the Royal Prussian Aeronautical Observatory at Lindenberg, has made a valuable present of kites and meteorographs for recording air pressure, temperature, relative humidity, and wind velocity.

A flying-bridge extends across the top of the deck-house from side to side of the ship, having hinged flaps at each end which project about four feet over the ship's side. A motor is fitted on top of the deck-house to drive the winches for water-bottle and current-meter work, of which one is fitted on each side of the bridge. A Lucas sounding machine is also fitted on the deck-house. Davits are placed at each end of the bridge, by means of which the wires from the winches are carried over the side. A winch for use in connection with a full-speed water-bottle is fitted abaft the poop. There is also on board a thermograph with three thermometers for recording sea temperature very accurately. This apparatus was invented by Professor Barnes, of Montreal, to investigate the relation between sea temperature and the presence of land or ice, and it is hoped that it will be possible to make valuable observations in regard to this relationship.

The vessel is provided with three chronometers and two Kelvin compasses. The compasses were adjusted on the morning of Saturday, 8th March, when the vessel was lying in the river.

The vessel undocked between 2 and 3 o'clock, and sailed at 11.20 a.m. on the morning of the 8th March.

It was considered desirable that the "Scotia" should be towed as far as Thurso so as to save coal and enable her to get a good start. Unfortunately, on arriving at the Pentland Firth, Captain Robertson found that there was such a heavy sea and head-wind that he thought the vessel would be unable to make any headway, and, in these circumstances, he put into Long Hope in the Orkneys, whence the vessel moved to Stromness on the 13th March.

The "Scotia" sailed from Stromness on the 18th March, but on the 22nd had to put back again into Carloway, in the Isle of Lewis, owing to stress of weather. She finally sailed on the 23rd March.

Three code messages have been received from the "Scotia" containing the results of five observations. These may be summarised as follows :—

Date.	Time.	Position.	Observation.
April 9th	7–9 a.m. ...	46° 45′ N. 44° 30′ W. Chart square. No. 8461.	Iceberg.
April 9th	1–3 p.m. ...	46° 45′ N. 45° 30′ W. Chart square. No. 1061.	Iceberg.
April 10th	10–12 noon ...	45° 45′ N. 47° 30′ W. Chart square. No. 0251.	No ice observed.
April 11th	10–12 noon ...	45° 15′ N. 51° 30′ W. Chart square. No. 0450.	No ice observed.
April 12th	10–12 noon ...	43° 45′ N. 49° 30′ W. Chart square. No. 0431.	No ice observed.

The "Scotia" reached St. John's on the 14th April and sailed on the 23rd April.

APPENDIX I.

List of Lines Participating in the Cost of the Ice Scout.

Hamburg-Amerika Linie.
Holland-Amerika Linie.
Norddeutscher Lloyd.
Red Star Line.
Compagnie Generale Transatlantique.
Austro-Americana.
Scandinavian-American Line.
Russian-America Line.
Allan Line.
American Line, Liverpool.
" " Southampton.
Anchor Line.
Atlantic Transport Line.
Canadian Northern Railway.
Canadian Pacific Railway.
Cunard Line.
Dominion Line.
Donaldson Line.
Johnston Line.
Leyland Line.
White Star Line.
Wilson Line.

APPENDIX II.

Instructions for Captain Robertson : S.S. "Scotia."

Being in all respects ready you should proceed with all despatch to Lat. 44° N., Long. 50° W. reporting on the way any ice met with and endeavouring to note its southern limit. From this position proceed to St. John's noting and reporting all ice met with.

On arrival there you should get into communication with the wireless stations on the coast of Newfoundland and Labrador and as far as possible ascertain the existing condition of the ice and where it has commenced to move.

Coal and provisions should be replenished at St. John's with all possible despatch, and leaving that port you should proceed to and report the southern limit of the drifting ice. Then proceed northward searching for ice bergs, field ice and other forms of ice, either drifting or temporarily fast along the east coast of Newfoundland and Labrador as far north as Hamilton Inlet. After passing that inlet proceed to the southward locating the eastern and then the southern limit of ice. Then call at St. John's for further orders.

All observations of ice movement and currents should be considered valuable.

Special vigilance should be observed in watching for ice that is nearing the steamer routes.

Every opportunity should be taken of communicating with the wireless stations on the coast of Labrador and Newfoundland, viz. : Indian Harbour, Domino Island, Venison Island, Battle Harbour, Chateau Bay, Belle Isle, Point Rich and Cape Race.

It must be borne in mind that the object of the expedition is to give warning to the steamship lines of the probable quantity of ice that will be in the vicinity of the track and to give them any information which will assist them to form a judgment as to the advisability of giving any instructions for the greater safety of their vessels.

In order to obtain accurate scientific data, three scientists have consented to accompany you, and you should consult with Mr. Matthews, the senior of these gentlemen, as to the movements of the vessel and the messages to be sent, so that the object of the expedition may best be served, bearing in mind that you are entirely in charge of the vessel and responsible for the safety of her and her crew.

Except when it will interfere with the object of the expedition, all opportunity should be given to the scientists to obtain the data which they require and every assistance that is possible should be rendered to them. These observations will be mainly for determining the directions, velocity and depth of currents with the temperature and salinity of the water, &c. and meteorological observations of the upper air including the investigation of the currents and temperature will also be carefully taken.

All information with regard to the ice and its present and probable movement should be communicated by you as often as practicable in accordance with the annexed instructions to a land wireless station for transmission direct to the Meteorological Office who will publish it as necessary. In addition to this any vessel in touch should be warned either by the code in the instructions or by ordinary message. All enquires as to the future movements of the vessel, &c. should be addressed to the Board of Trade, from whence further instructions as to return to England or other orders will be sent to you.

Should time permit you may be required to make a detour on your passage home northward to Cape Farewell; thence proceeding along the south-east coast of Greenland to Denmark Strait, for the purpose of ascertaining the conditions, as regards ice, that exist off the south and south-east coasts, which should be examined as closely as a running survey, at a reduced speed, will permit. The set and velocity of the current should be estimated at the same time. The state of the ice in Denmark Strait should then be observed and the southern limit of the ice barrier determined.

The velocity and temperature of the cold East Greenland current, which flows southward on the western side of the strait and of the warm Irminger current, which flows northward on the eastern side, should be measured, at and below the surface, by current meter.

APPENDIX III.

List of the Crew of the "Scotia."

Names.	Capacity.	Wages per Month. £	s.	d.	Remarks.
Thomas Robertson	Master	26	13	4	
L. Potter	1st Mate	15	0	0	
H. L. Humphreys	2nd Mate	12	0	0	
James B. Robertson	3rd Mate	10	0	0	Engaged on board.
J. Martin	Carpenter	7	10	0	
~~C. Simpson~~	~~Bos'n~~	~~6~~	~~10~~	~~0~~	Failed to join.
D. Ramsay	Bos'ns Mate	6	0	0	
William Anderson	A.B.	5	10	0	
T. A. Anderson	A.B.	5	10	0	
Charles Findlay	A.B.	5	10	0	
R. Smith	A.B.	5	10	0	
W. Watson	A.B.	5	10	0	
James Vannet	A.B.	5	10	0	Promoted to Bos'n at £6 10s.
William Davies	A.B.	5	10	0	
Alexander Mitchell	A.B.	5	10	0	
James Clark	A.B.	5	10	0	
J. Stevenson	A.B.	5	10	0	
Thomas Ritchie	Sailor	5	10	0	Substitute engaged on board.
William Simpson	Sailor	4	10	0	
Charles Ramsay	O.S.	4	10	0	
Thomas A. Anderson	O.S.	4	10	0	
T. Mitchell	Steward	8	0	0	
T. Macallister	Asst. Steward	7	0	0	
James Beaton	Mess Room Boy	2	10	0	
~~J. Ireland~~	~~Mess-Room-Boy~~	~~2~~	~~10~~	~~0~~	Failed to join.
David Gridwood	Cook	7	0	0	
~~Donald Ireland~~	~~Assistant-Cook~~	~~6~~	~~10~~	~~0~~	Failed to join.
Edgar T. Meredith	1st Engineer	16	0	0	
R. Mitchell	2nd Engineer	12	0	0	
Hugh Mitchell	Fireman and Blacksmith	6	0	0	
John Webster	Fireman	5	10	0	
Joseph Kennedy	Fireman	5	10	0	
James Doran	Fireman	5	10	0	
W. Potter	Fireman	5	10	0	
John Davidson	Fireman	5	10	0	
Donald J. Matthews	Chief Scientist	60	0	0	
G. Taylor	Scientist	30	0	0	
Lionel R. Crawshay	Scientist	25	0	0	
H. J. Gallagher	Marconi Operator	7	10	0	
William Smith	Asst. Marconi Operator	6	0	0	

Exhibition.—Exhibits in connexion with the investigation of the upper air were lent to the Royal Institution in connexion with Mr. C. J. P. Cave's lecture on Friday, April 11th, on "Winds in the Free Air." Since the lecture Mr. Cave has presented to the Office a map showing on true vertical scale the general distribution of upper currents in relation to surface currents, for a conventional distribution of pressure, which was prepared for the lecture. The map has been placed in the Forecast Room.

Reports of Work.—*Corps of Observers on duty during March and April.*—B. G. Brame, C. E. P. Brooks, W. B. Greening, W. Hayes, A. G. W. Howard, J. H. James, C. F. J. Jestico, A. A. Lovie, M. H. Megrah, R. Pyser, P. N. Skelton, M. T. Spence, A. J. Tabor, W. J. Tomkins.

Publications.—Seaman's Handbook.—A preface setting out the present position with regard to the use of the barometer at sea, and other points in connexion with the practical application of Meteorology in the interests of seamen, has been prepared, and the handbook is ready to go to press. Captain Hepworth has, however, raised in a memorandum the question of an author's name on the title page.

It was decided to adhere to the principle of providing a series of handbooks to be issued by the Office without any author's name on the title page.

Reports of Work for March and April.—1. *Marine Division.*—Examined 39 new Meteorological Logbooks, and 1 Lighthouse Register. Received 221 North Atlantic Registers, Form 121, and 121 Radio-telegraphic Registers, Form 138, for *Monthly Meteorological Charts of the North Atlantic and Mediterranean.*

33 reports of Indian Ocean weather, Form 122, for *Monthly Meteorological Charts of the Indian Ocean.*

Wireless Telegrams from Ships.—Weekly lists, charts, &c. as usual. Corrections for 31 barometers,

Reports of Ice.—To Shipping Gazette, 4; Journal of Commerce, 2; and to Shipping Companies in connexion with Ice-Scout "Scotia."

Extraction of observations relative to Davis Strait weather.—19 logs.

Indexing data in ocean 10° squares.

2. *Forecast Division.*—(1) Current work has been kept up to date.

(2) Number of wireless messages has been :—

(*a*) From H.M. Ships, March, 3, April, 0,

(*b*) From ships of Mercantile Marine, March, 424, April, 426.

(3) Corrections to Daily Weather Report up to April prepared and issued.

(4) Forecast Checking up to end of October.

(5) Wind Frequency tables prepared up to end of February.

(6) Working Charts prepared for binding up to 30th November.

(7) Inquiries :—

	March.	April.
Prepaid Replies	26	12
Other Telegraphic Inquiries	7	11
Wireless Inquiries	—	—
Telephone Inquiries	11	11
Personal Inquiries	1	1

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, 1912 and 1913.

Parts I. and II.—Weekly and Monthly Issues up to date.

Appendix III. for 1912 issued.

Annual Summary to Part II. for 1912 issued.

Part III. Section 1.—Monthly Values prepared up to date.

Section 2.—July, 1912, issued. August, 1912, sent to printer.

Part IV. Section 1 :—

Kew, August, 1912, issued.

Valencia, September, 1912, issued.

Eskdalemuir, September, 1912, issued.

Section 2.—Aberdeen, Summaries completed up to June, 1912.

Falmouth, Summaries completed up to June, 1912.

The examination of the Observatory records and of sunshine cards, the tabulation of cup anemograms, and the summaries of pressure tube anemograms have been kept up to date.

The photographic barograms at Kew Observatory have been tabulated in millibars from February 16th, 1913.

Library :—	Mar.	April	Total.
Authors' cards prepared for Catalogue ...	59	71	130
Cards prepared for Subject Catalogue ...	78	—	78
Inquiries :—			
Newspapers	3	6	9
Legal	11	20	31
Scientific and Commercial	43	58	101
Forecasts	3	2	5
General	3	3	6
	£ s. d.	£ s. d.	£ s. d.
Receipts in connexion with Inquiries	5 10 5	6 12 0	12 2 5

The values of rainfall recorded by protected and unprotected gauges at Eskdalemuir have been discussed in relation to wind force and direction.

Frequencies of temperature and sunshine have been extracted for 19 stations from the current returns.

Tables have been prepared for use in connexion with the tabulation in millibars of the photographic barograms from Valencia.

The returns from 77 rainfall stations have been summarised preparatory to the publication of the monthly totals at the end of the year.

4. *Instruments Division.*—Admiralty Work.—Supplies have been sent to Portsmouth, Sheerness, Chatham, and Devonport.

Marine Work.—Ten ships have received supplies directly from the Office : the stocks of five agents have been replenished.

New instruments have been sent to three sea temperature stations.

Telegraphic Stations.—Three new storm cones have been sent out. A complete set of instruments, including barograph, thermograph, hygrograph, and sunshine recorder, has been sent to Glasgow (Springburn Park).

Sundry deficiencies at six stations have been met.

Observatories.—The kite winding gear purchased from Mr. Sotheby has been sent to Eskdale. Sets of Absolute Thermometers (wet, dry, maximum and minimum) have gone to Eskdale, Kew, Valencia, and Aberdeen.

Home Requisitions.—Twelve local authorities and private observers have been supplied with instruments on repayment.

Colonial Requisitions.—Twelve consignments have gone to the Colonies and Dominions.

A set of instruments for H.M.A.S. Australia has been issued to the order of the Commonwealth Government.

Meteorograph boxes have been sent to four persons.

Exhibition.—An anemometer and two meteorographs have been sent to the British Section of the International Exhibition at Ghent.

Admiralty Work.—The new system for recording the stock of Admiralty Instruments came into force on April 1st.

5. *Investigation of the Upper Air* (Mr. W. H. Dines's report for quarter ending March 31st, 1913). —The ordinary work of the station has been carried on as usual and an unusually large proportion (eight out of nine) of the balloons have been found. A considerable number of instruments and some apparatus was got ready for Mr. G I. Taylor, and sent to Dundee to the "Scotia."

Publications.—Report for March and April, 1913, from Clerk of Publications :—

—	March.		April.	
	Received.	Issued.	Received.	Issued.
Daily Weather Report ...	835	827	810	786
Weekly Weather Report ...	375	323	375	318
Monthly Weather Report ...	575 (Feb.)	465	575 (March)	461
Do. do. (Maps)	25	2	25	2
Daily Readings	100 (Title Page & Maps, 1912)	49 (Title Page & Maps, 1912) 49 (Dec.)	—	—
Geophysical Journal ...	150 (May)	132	150 (June)	132
Hourly Values — Meteorological.—Kew	300 (June)	11 (June)	300 (July)	11 (July)
Eskdale	300 (June & July)	11 „	300 (July & Aug.)	11 „
Valencia ...	300 (August)	11 „	300 (Sept.)	11 „
Do. —Geophysical ...	—	—	—	—
Monthly Meteorological Charts (Atlantic).	600 monthly (to April, 3)	455	600 monthly (to May, 2)	556
Monthly Meteorological Charts (Indian).	350 (April)	219	350 (May)	285
International Upper Air Observations.	50 (Dec., 1910) 50 (Jan., 1911)	31 30	50 (Feb. & Mar., 1911)	30
Seventh Annual Report ...	—	—	—	1
Observer's Handbook (1911)	—	3	—	6
"Forecasting Weather" ...	—	2	—	1
Cloud Atlas	—	—	—	—
Report — Commission for Weather Telegraphy.	—	3	—	18
Report — Commission for Maritime Meteorology.	—	5	—	22
Summary of Signals ...	—	4	—	8
Calendar, 1913	—	2	—	1
Structure of the Atmosphere	—	—	—	—
Geophysical Memoirs, No. 1	—	5	—	2
No. 2	—	4	—	—
No. 3	—	4	—	—
No. 4	—	3	—	—

Receipts from sales at M.O.—March, 1913, £3 19*s.* 6*d.*—April, 1913, £2 3*s.* 3*d.*

New Publications.—"Instructions for Meteorological Telegraphy," new edition, is in the press. 75 copies will be printed as soon as possible. The type will be kept standing, so as to enable the necessary alterations to be made when the revised international code comes into operation in May, 1914. "Geophysical Memoirs," Nos. 5, 6 and 7, also "Codes of Signals adopted and recommended by the International Meteorological Committee, &c.," 1913 edition, are in the press.

M.O. Press.—During the two months ended April 30th, 1913, the issue of the periodical publications has been as follows :—Daily Weather Report, maps for the Weekly Weather Report, maps for the Monthly Weather Report, Monthly Meteorological Charts of the North Atlantic, Monthly Meteorological Charts of the Indian Ocean, as contract.

On March 1st there were three requisitions for forms outstanding. Since that date four requisitions have been issued and five discharged, leaving two requisitions still on hand.

175 additional copies of the Daily Weather Report have been printed during the period in compliance with requests received from Educational Authorities.

Branch Office.—Mr. J. S. Dines's reports—(March, 1913).—A protecting case has been made to cover the clock drum and recording mechanism of the combined velocity and direction anemograph

A stand has been constructed to facilitate the photographing of anemometer curves and diagrams

Some further experiments have been carried out having reference to the overrun of pressure-tube anemometers.

A report on "Cliff Eddies" has been drawn up.

A diagram has been prepared showing the relation between the surface and gradient winds for Pyrton Hill.

Wise has assisted at the general work and devoted the remainder of his time to work for the Meteorological Office.

(April, 1913).—I have worked up the records from 9 ballon-sonde ascents made at Farnborough during the past winter by Mr. A. Ryan.

Certain alterations have been made in the second self-recording theodolite similar to those made in the first in December, 1912, so that both instruments now incorporate the improvements suggested by extended use at Farnborough last autumn.

I have taken a week's holiday during the month.

Wise has continued the work of comparison of surface with gradient winds for different stations and kept the analysis work up to date for the anemograms from selected stations.

Observatories—Kew.—(March and April, 1913).—The barograph, thermograph and anemograph (Robinson Cup) curves been tabulated as usual and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

		March.	April.
Magnetic	Declination	4	6
	Inclination	4	5
	Horizontal Force	4	5
Potential Gradient on		11 days	13 days
Wilson Apparatus		6 „	8 „
Pyrheliometer		4 „	7 „

International cloud observations were made on six days.

Several comparisons have been made of the Working Standard (Newman) with the large standard barometers.

Six determinations of the horizontal magnetic force were taken with the Unifilar No. 140, between April 1st and 10th, with a view to standardizing the observations taken with it during March at Eskdalemuir.

A joint paper by Messrs. Corless, Dobson and the Superintendent on the phenomena accompanying the solar eclipse of April 17th, 1912, was read before the Royal Meteorological Society on April 16th.

The returns for the last quarter of 1912 for the Geophysical Journal have been checked and sent to the Office.

The magnetic character figures for the first quarter of 1913 have been got out and sent to de Bilt.

A new Stevenson screen has been erected on the lawn.

Photographic paper has been supplied to Eskdalemuir and Valencia Observatory and Fiji.

The police protection has been continued up to the present date by night, and protection by day continued until the 17th.

The Superintendent was away from the 10th to the 15th visiting Eskdalemuir Observatory, where he took a number of absolute magnetic observations. He has been absent from the Observatory through an attack of influenza. Mr. E. Boxall and Mr. Harris have also suffered from influenza.

Eskdale (March, 1913).—General.—The general work of the Observatory has been continued during the month and the usual records have been maintained without any noteworthy incident. Dr. Chree visited the Observatory for nearly a week at the beginning of the month, making a number of absolute magnetic determinations with Unifilar No. 140, which he brought with him. Dr. Shaw spent a week-end at the Observatory and inspected the buildings. Mr. L. F. Richardson, Superintendent-elect, and Mrs. Richardson also paid a brief visit.

Seismology.—There was a considerable earthquake on the 14th, at 9 a.m., shown on all the instruments, and another on the 31st, of lesser importance. The former, however, was a good deal disturbed by wind and microseisms, which made the identification of the various phases distinctly difficult. On the morning of the 10th a very serious explosion of dynamite took place at the Ardeer works of the Nobel Company, near Stevenston, about 64 miles W.N.W. of the Observatory. This was distinctly felt at Moffat, only 10 miles west of the Observatory, and by some persons in this parish, and an examination of the traces of the different seismographs was made the following day to see if any record of the explosion could be detected. Nothing appeared to be shown, the reasons being probably that most of the concussion effects noticed at a distance were propagated by the air, that part of the disturbance which came through the earth consisting of waves of such short period as the instruments, whose periods varied from 10 to 23 seconds, failed to indicate.

An official report on this occurrence has been asked for, and all the records are being re-examined in the light of the more accurate data as to time, &c., now available.

Magnetism.—The routine work has been maintained during the month and the arrears in computing and in the tabulation of the curves are being dealt with. It is hoped to have everything quite up-to-date by the time of the next report. The Watson balance, referred to in the last report, is now properly installed and working as an observatory instrument. Till some experience has been obtained, the results from it and from the Adie vertical force instrument are both being tabulated.

The floor of the west room of the magnet-house has now been laid and the room thoroughly cleaned and distempered, and the unpleasant smell formerly prevalent has disappeared.

The drift of the zero of the Adie vertical force instrument continues, and a readjustment of the magnet was made on the 31st.

Dr. Chree, whose visit has been alluded to, drew attention to a number of points relating to the methods, the records, and the apparatus used in the magnetic work of the Observatory, and his advice on a number of matters has been very valuable. A report to the Director on the magnetic absolute instruments is being prepared in the light of experience and of his criticisms.

Atmospheric Electricity.—The electrograph has worked normally throughout the month. The water spray from the jet falls in great measure on the steps leading from the workshop door on the north wall of the Observatory, and during cold weather it is not uncommon to find several inches of ice on these steps. Some consideration has therefore been given to what would be the best alternative arrangement for the position of the tank and jet, and the work thus involved were it possible to remove them to some more favourable position.

Experimental Work.—Not very much time has been available during the month for research, but some progress has been made and traces have been obtained from each of the instruments mentioned under this heading in last month's report.

Owing to lack of suitable photographic drums for the two earth-current and the inductor galvanometers to run independently, arrangements have been made for these to trace upon the same large fast-running drum, but this re-organisation has involved changes in some of the optical work which have caused delay. The necessary mirrors are now to hand and it is hoped in course of a few days to have the whole arrangement at work.

Miscellaneous.—Arrangements have been made for the charging of one or two portable accumulators from a thermogenerator, and an ether-oxygen blowpipe has been fitted up for work on the quartz fibres of the Watson quartz-thread magnetograph.

A rough survey of the lower part of the Observatory grounds was made for the purpose of furnishing to the Meteorological Office some data required in connection with the anemometer observations.

Buildings, &c.—The minor repairs commenced last month by the Office of Works to the buildings have now been completed and a spring clean of the interior has also been made.

The drains to the magnet house are now in process of being considerably deepened, and the whole of the turf roof has been greatly improved by the gardener by suitable treatment. It will probably now throw off rain and snow water much more completely than before.

A good number of trees, supplied gratis by Mr. Beattie, of Davington, have been planted in the grounds.

(April, 1913).—General.—The general work of the Observatory has been maintained during the month and the usual records continued.

Mr. Stonier (mechanic) was off duty for a week owing to illness, but is now recovered.

Mr. Parkinson received at the end of the month, an offer of an appointment on the Magnetic Survey conducted by the Carnegie Institution of Washington, and has tendered his resignation.

Mrs. Richardson (wife of the Superintendent elect) spent a few days at the Observatory during the installation of their furniture in the Superintendent's house.

Seismology.—There have been several earthquakes during the month, but most of them were a good deal disturbed by wind and microseisms.

With a view to economising paper Mr. Dines has fitted the Milne instrument with a spindle having half the pitch of the former one, thus bringing the lines of the trace closer together on the sheet. The instrument now runs for four days, two papers serving for a week instead of four as formerly.

The Ardeer Gun-Cotton Explosion.—As referred to last month, an official report on this explosion was asked for by the Meteorological Office and furnished through them to the Nobel Company. Careful examination of all the traces of all self-recording instruments failed to reveal any phenomenon which could be identified with certainty with the explosion, but possible causes of the explosion were discussed in the report, and suggestions as to measures of safety against electrical ignition of gun-cotton were proposed. On receipt of this report Col. Sir F. Nathan (the Works Manager) arranged to send Mr. Rintoul, the chief chemist, with papers and full information, to visit the Observatory to discuss further details. Some supplementary suggestions were forwarded after this interview and the whole of the correspondence between the Observatory and Nobel's was subsequently sent by them to the Home Office. Major Cooper-Key requested, and was granted by the Meteorological Office, permission to utilise this matter in his official report on the disaster.

Magnetism.—The routine work has been maintained during the month. The Watson Balance has been fitted with an electrical time signal and the results obtained from it are being tabulated along with those of the old Adie instrument. The atmosphere of the magnet-house seems to be improved, and no unpleasant smell is now noticeable.

A report on the behaviour of the Adie V. F. instrument has been drawn up for submission to the Magnetic Sub-Committee.

Meteorology.—A new self-recording thermometer tube has been fitted into the photographic thermograph for the Wet bulb which has been out of action since last August.

Experimental.—Some little progress has been made with experimental work. It has been found that even during magnetically quiet times sudden oscillations occur in the magnitude of the earth currents circulating between various plates buried in the Observatory grounds, and described in earlier reports. The arrangement used to detect these has been the balancing of a large percentage of the E.M.F. set up between the plates by means of a suitable potentiometer leaving the residual force to act directly on a low resistance galvanometer of considerable sensitiveness. The effect of wind, which was troublesome on some of the earlier work, has been largely reduced by improvised arrangements of the instrument and recording apparatus, and it is hoped to obtain some definite results both on earth currents and recording earth inductor within a short period.

Wireless Time Signal.—An outfit of apparatus for the reception of the Eiffel Tower time signal by wireless telegraphy has been purchased and is in course of being installed in the tower room.

Some preliminary experiments with an improvised aerial showed a series of signals near each hour which did not accord with the present international scheme. It was ultimately found that these proceeded from the minute spark made by the seismograph clock for the Galitzin seismographs at make and break of the signal. A silence chamber with double walls padded with sawdust is being constructed in the tower room to cut out the considerable noise due to the prevailing winds.

Buildings.—The deepening of the drains to the magnet house has been completed, and as soon as the work has been approved by the Office of Works architect they will be filled in.

Accounts.—*Travelling Expenses.*—The payment of £50 on account (*see* Estimates, p. 226) of travelling expenses in connexion with the meeting of the International Meteorological Committee in Rome, amounting to £70 7*s.* 11*d.* was authorised.

Submitted—The following Statement of Accounts for the Year ending 31st March, 1913 :—

RECEIPTS.						PAYMENTS.				
1911–12. £ s. d.		£ s. d.	£ s. d.	1912–13. £ s. d.		1911–12. £ s. d.		£ s. d.	£ s. d.	1912–13. £ s. d.
1,298 16 3	Balance from year 1911–12	—	404 6 4			1,000 0 0	Director	—		1,000 0 0
16,850 0 0	Parliamentary vote	—	17,000 0 0				OFFICE SALARIES (including Insurance) :			
	M.O. OBSERVATORIES :					7,720 14 11	Monthly	7,743 13 11		
909 9 8	Kew	1,032 7 4				680 12 1	Weekly	909 11 3		
1,123 15 1	Eskdalemuir ...	1,348 7 5				—	Less refunds ...	8 4 5		
17 10 0	Valencia	65 2 11							8 645 0 9	
—	Farnborough ...	400 0 0				1,587 13 0	M.O. OBSERVATORIES : Kew	1,625 16 9		
138 2 0	Sale of Forms, &c.	109 9 6				1,379 18 7	Eskdalemuir ...	1,406 5 1		
			2,955 7 2			471 15 5	Valencia	539 11 0		
	DEPARTMENTAL EXPENSES REPAID :					—	Farnborough ...	366 13 1		
207 10 9	Forecasts, &c. ...	163 2 3							3,938 5 11	
126 13 11	Marine, Statistics, and Observatories	104 19 1				683 16 8	OFFICE EXPENSES : Rent, Fuel, &c. ...			700 0 11
133 13 4	Instruments ...	168 2 2				588 9 10	Furniture, Fittings, &c.	313 11 11		
			436 3 6			400 3 0	Incidental Expenses	377 8 3		
	INCIDENTAL EXPENSES REPAID :								697 0 2	
397 6 10	Forecasts, &c. ...	445 0 6				306 16 2	POSTAGE : General Postage ...	297 8 11		
66 6 5	Other Branches ...	76 4 10				348 19 2	Postage of Daily Weather Reports...	369 14 11		
52 5 11	Stationery Office Account ...	50 11 2							667 3 10	
			571 16 6			2,831 13 5	TELEGRAMS, &C. ...	—	2,602 10 10	
	TELEGRAPH CHARGES REPAID :									
229 12 11	Home	216 3 2				230 13 9	TRAVELLING EXPENSES (INSPECTIONS, &C.)	—	308 17 6	
433 16 7	Telegrams sent abroad	388 19 3								
			605 2 5				SUPERANNUATION :			
	INSTRUMENTS :					606 17 6	Funded annuities ...	715 0 0		
512 4 6	Royal Navy ...	742 2 10					Non-funded pensions			
1,130 13 10	Mercantile Marine, Stations, &c. ...	2,600 0 9				775 4 6	and fund	652 8 3		
			3,342 3 7						1,367 8 3	
—	INSPECTIONS ...	—	156 12 5				COST OF INSTRUMENTS :			
						510 8 6	Royal Navy	738 12 6		
	SUPERANNUATION ACCOUNT :					1,647 15 6	Mercantile Marine, Stations, &c. ...	3,236 11 7		
606 17 6	Annuities... ...	715 0 0							3,975 4 1	
80 15 10	Interest on Investments	52 19 4					AUXILIARY OBSERVATORIES, &C.			
17 10 0	Income Tax returned	8 15 0				2,386 11 3		2,246 14 8		
			776 14 4			417 13 4	Lectures and Experiments	350 0 0	2,596 14 8	
	LECTURES AND EXPERIMENTS ...									
585 12 7		—	345 18 5				BALANCE :			
	DONATIONS FOR MEMORIAL MEDALLIONS... ...					361 17 0	Cash at Bank ...	47 16 8		
61 9 0		—	—			42 9 4	,, at Office ...	48 1 1		
									95 17 9	
£24,980 2 11			£26,594 4 8			£24,980 2 11			£26,594 4 8	

LIABILITIES.					ASSETS.			
£ s. d.		£ s. d.		£ s. d.			£ s. d.	
1,451 4 4	To sundry creditors	1,748 8 11		404 6 4	By cash at Bank and at Office ...		95 17 9	
198 7 5	,, balance	—		—	,, salaries reserved		11 7 9	
				295 11 9	,, M.O. instruments in stock ...		299 8 11	
				949 13 8	,, sundry debtors		1,272 12 11	
				—	,, balance		69 1 7	
£1,649 11 9		£1,748 8 11		£1,649 11 9			£1,748 8 11	

NOTE.—On 31st March the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £2,119 5*s.* 11*d.*

Observatories.—Statement of Accounts for the Year ended 31st March, 1913 :—

KEW.

1911–12. £ s. d.	Receipts.	1912–13. £ s. d.
446 17 11	Gassiot Trust	685 1 1
375 0 0	National Physical Laboratory ...	281 5 0
5 0 0	Grazing Rents	5 0 0
82 11 9	Miscellaneous	61 1 3
678 3 4	To Balance	593 9 5
£1,587 13 0		£1,625 16 9

1911–12. £ s. d.	Payments.	£ s. d.	1912–13. £ s. d.
656 10 10	Superintendent		656 10 10
405 8 5	Assistants		417 6 7
81 10 0	Caretaker...		99 19 5
16 5 0	Sundays and holidays ...	15 3 8	
94 2 9	Overtime	102 13 4	
			117 17 0
116 16 9	Rent, fuel, and lighting		89 6 10
5 12 10	Repairs		28 7 1
5 12 3	Insurance...		7 2 9
59 13 0	Materials		56 12 5
37 9 11	Instruments		92 18 5
37 15 10	Books, printing, and stationery		5 11 0
70 15 5	Incidental expenses ...		54 4 5
£1,587 13 0			£1,625 16 9

ESKDALE.

1911–12. £ s. d.		1912–13. £ s. d.
1,000 0 0	Royal Society (Parliamentary Grant)	1,000 0 0
—	Salary of Assistant in Seismology to 31st March, 1913 ...	302 7 11
104 9 10	Dr. Schuster...	—
19 5 3	Miscellaneous	45 19 6
256 3 6	To Balance	57 17 8
£1,379 18 7		£1,406 5 1

1911–12. £ s. d.		£ s. d.	1912–13. £ s. d.
400 0 0	Superintendent — (Dr. Walker 3 qrs., for Dr. Harker 2 months) ...		366 13 4
375 16 2	Assistants (including special provision for January)		492 14 7
109 4 0	Mechanic and Caretaker		110 5 7
52 0 0	Handyman		52 2 6
23 18 9	Books, stationery, &c. ...		20 4 0
10 18 4	Insurance		5 19 8
39 9 2	Travelling expenses ...		16 7 4
	Incidental expenses :—		
27 15 0	Rental of private wire	28 15 0	
154 1 10	Instruments and repairs	19 5 0	
53 13 9	Photographic paper ...	62 14 0	
75 5 10	Coals and carriage of coals, light	132 11 7	
13 13 0	Repairs, &c.	61 14 4	
44 2 9	Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	36 18 2	
			341 18 1
£1,379 18 7			£1,406 5 1

VALENCIA.

1911–12. £ s. d.		1912–13. £ s. d.
—	Royal Society (magnetic observations)	47 12 11
17 10 0	Grazing Rent	17 10 0
454 5 5	To Balance	474 8 1
£471 15 5		£539 11 0

1911–12. £ s. d.		1912–13. £ s. d.
275 0 0	Superintendent	275 0 0
122 5 0	Assistants	121 7 2
—	Magnetic observations	42 0 0
19 12 2	Rent, rates, and taxes	23 7 1
—	Private wire	13 5 0
54 18 3	Miscellaneous expenses	64 11 9
£471 15 5		£539 11 0

FARNBOROUGH.

1911–12. £ s. d.		1912–13. £ s. d.
250 0 0	Advisory Committee	400 0 0
6 18 7	Admiralty	—
10 5 3	To Balance	—
£267 3 10		£400 0 0

1911–12. £ s. d.		1912–13. £ s. d.
200 0 0	Meteorologist	225 0 0
67 3 10	Other Expenses	141 13 1
—	By Balance	33 6 11
£267 3 10		£400 0 0

Submitted—the following statement of expenditure and receipts for the year 1912-13 in comparison with the estimates of Minute 319.

Heads of Service.	Proposed for 1912-13.	Realised.	Difference.	
			Excess.	Defect.
	£	£	£	£
1. Director	1,000	1,000	—	—
2. Office salaries	8,676	8,645	—	31
3. Observatories	3,881	3,938	57	—
Office expenses :				
4. Rent, fuel and lighting	730	700	—	30
5. Repairs, furniture, and incidental expenses.	405	697	292	—
6. Postage	650	667	17	—
7. Telegrams	2,475	2,603	128	—
8. Travelling expenses	340	309	—	31
Superannuation allowances :				
9. [Funded annuities]	750	715	—	35
10. [Non-funded pensions and fund]	633	652	19	—
11. Cost of instruments	2,310	3,975	1,665	—
12. Allowances for auxiliary observatories, observers, &c.	2,731	2,597	—	134
Totals	24,581	26,498	2,178	261
Appropriations in aid :				
13. Observatories	2,428	2,955	527	—
14. Departmental expenses refunded	435	436	1	—
15. Incidental expenses refunded	495	572	77	—
16. Telegraphic expenses refunded	560	605	45	—
17. Costs of instruments refunded (Navy) ...	510	742	232	—
18. „ „ „ „ (other sources).	1,500	2,600	1,100	—
19. [Inspections]	—	157	157	—
20. Superannuation	800	777	—	23
21. Lectures and experiments	400	346	—	54
22. [Drawn from balance]	603	308	—	295
23. Parliamentary Grant	16,850	17,000	150	—
Totals	24,581	26,498	2,289	372

Notes.—No 5. The excess includes the items of furnishing outstanding at the end of 1911-12. The incidental expenses are £77 in excess of the estimate.

No. 7. Storm warnings cost £369 as compared with an estimate of £300 and the allowances to P.O. Clerks amounted to £208, instead of £135.

No. 11. The excess is accounted for by a large increase in orders on repayment, not all of which are brought to account in the appropriations in aid.

No. 13. This item is accounted for mainly by the inclusion of £373, payments in arrear last year (*see* D 05), the continuance of the N. P. L. payment for Kew (£31), and an increase in the sale of observatory forms, &c. (£61). Miscellaneous receipts not estimated amounted to £62.

No. 19. See Minutes 329, 334.

No. 23. See Minute 335.

Submitted—The following statement of the Bank Account in the Cash book :—

	£	s.	d.
Balance on 28th February, 1913	2,029	11	10
Receipts from 1st to 31st March, 1913	1,568	1	9
	3,597	13	7
Cheques drawn from 1st to 31st March, 1913	3,549	16	11
Balance on 31st March, 1913	£47	16	8

FORTY-NINTH MEETING.

South Kensington, S.W., 25th June, 1913.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

CAPTAIN HARVEY.	CAPTAIN LYONS.
THE HYDROGRAPHER.	MR. MIDDLETON.

DR. SCHUSTER.

400. The Minutes (391–399) of the last Meeting (30th April, 1913) were read and confirmed.

401. ACCOUNTS FOR THE YEAR 1912–13.—The excess of expenditure over estimates, after an examination of the items, was approved as set out in Minute 399.

402. CORRESPONDENCE. — **Estimates for 1913–14.** — Reported — Treasury letter 10044/13 of 3rd June, acknowledging the receipt of the Committee's letter 933/C.06 (Minute 393).

Treasury Chambers,
3rd June, 1913.

SIR,

I AM directed by the Lords Commissioners of His Majesty's Treasury to acknowledge the receipt of your letter of the 8th ultimo (933/C.06), written by direction of the Meteorological Committee, respecting the distribution of the grant to the Committee for 1913–14.

I am, &c.,
T. L. HEATH.

The Director,
Meteorological Office.

Forecasts.—Reported—the following note (2117) on document A 16509 of the Board of Agriculture, received from Mr. Middleton (*see* Minute 389) :—

DOCUMENT A 16509 OF THE BOARD OF AGRICULTURE, RECEIVED FROM MR. MIDDLETON

Encloses question put to the Secretary of the Treasury by Mr Charles Bathurst (M.P. for Wilton Division of Wiltshire, and a Governor of the Royal Agricultural College, Cirencester), on motion for adjournment of House of Commons on 6th May, 1913, asking under what section of the Development and Road Improvement Funds Act the objection to grant a sum to the Meteorological Committee from such fund for the free distribution of forecasts was justified.

Quotes from Dr. Shaw's book on the utility of forecasts, mentions the large amounts spent in U.S.A., Mexico, &c., and quotes also from Dr. Shaw's letter to Milborne St. Andrew Farmers' Club.

Mr. Masterman demurred to being pressed on any matter connected with the action of the Development Commissioners, and said that the Act specially arranged to give the Commissioners a free hand uncontrolled by Government, in order that the funds should not be dissipated in grants to subjects cognate to Agriculture or Fisheries.

Royal Meteorological Society (Minute 315).—Submitted—the following :—

REPORT of the JOINT COMMITTEE of the METEOROLOGICAL OFFICE and the ROYAL METEOROLOGICAL SOCIETY.—May 1913 (M.O. 2340).

The Committee has decided that the period to be dealt with in the discussion of observations shall be the 40 years 1871–1910. Standard historical values of barometric pressure have been extracted for the following places and dates, and are under discussion :—

Greenwich	1841–1910	Shetland	1856–1910
Armagh	1833–1910	Oxford	1855–1910
Stonyhurst	1848–1910	Aberdeen	1856–1910
Glasgow	1869–1910	Valencia	1869–1910
Stornoway	1855–1910	Falmouth	1869–1910

Monthly sea-level values are also available for London 1774–1910, and Edinburgh 1770–1910. Monthly sea-level values for the standard period of 40 years have been worked up for 23 stations, and the results plotted. This series will be added to by values from second [order] stations, making interpolation where necessary.

Draft maps are being prepared for each lustrum.

An experiment in the construction of monthly frequency curves is being made for one station.

The projection and scale of the final maps is receiving special consideration. The extraction of observations of wind direction is being proceeded with, the data used being those from second order stations. Special attention will be given to the question of wind force and possible applications of Lambert's or other formula.

H. N. DICKSON,
Chairman.

403. ANNUAL REPORT.—The report was presented in galley proof, and ordered to be circulated in paged proof for consideration at a meeting to be held on July 16th.

404. M.O. OBSERVATORIES.—**Kew.**—*Structural Alterations* (Minute 378).—Reported—that the staff had been transferred from the main building to the clinical house, and that a tender from the Army and Navy Auxiliary Co-operative Supply, Ltd., for £15, for packing the books, instruments, and ornaments in packing cases, and removing them to the packing house or elsewhere for storage, for not more than six months, had been accepted, and the transfer had been completed on June 14th. Mr. Seccombe, of the Office of Works, has reported that workmen will probably begin work in the current week.

Tests of magnetic instruments.—Reported—that the question of testing magnetic instruments by the Observatory on behalf of the Office had been before a meeting of the Magnetic Sub-committee of the Gassiot Committee, which had drawn up a scale of fees for the tests. The Superintendent of the observatory had already notified the instrument makers and principal foreign observatories of these proposals.

It was ordered that a statement of the undertaking of the Office with regard to tests and the scale of fees be drawn up for consideration at a future meeting.

Eskdale.—*Furniture, Fittings, &c.* (Minute 395).—Reported—that redecoration of the Superintendent's house at an estimated cost of £20 7*s.* 8*d.*, exclusive of any necessary work in the guest rooms, had been ordered on recoverable order from the Office of Works.

The orders for the necessary work in the guest rooms were given on June 23rd, when the Director was on a visit, by invitation of the Superintendent, Dr. Harker, to attend an afternoon party on June 21st, which was attended by 110 ladies and gentlemen from the neighbourhood.

Seismology, Motor Car.—Read—the following letters (1,767, 2,530) :—

Burlington House,
London, W.,
22nd April, 1913.

DEAR DR. SHAW,

WE received this morning a cheque for £100, being the second instalment of a donation which, as you may remember, Mr. Matthew Gray made to the Society for the purposes of seismology at Eskdalemuir, and which was reported to the Gassiot Committee on October 25th, 1911. So far as I can ascertain from our account books none of this money has been paid over into your hands, and I shall be glad to know whether I should now ask the Treasurer to draw a cheque in favour of the Meteorological Committee, or what other course, if any, you think should be adopted.

The executors of Lord Rosse paid over to the Royal Society the balance of £26 15*s.* 11*d.* in their hands on account of the Valencia Fund and out of that we sent you £5 17*s.* 6*d.* to meet some arrears due on this account. I should be glad to know what you think should be done with the balance. At present it is floating in a suspense account in our books and I should like to get it cleared off.

Believe me, &c.,
ROBT. HARRISON.

Dr. W. N. Shaw, F.R.S.

Burlington House,
London, W.,
June 13th, 1913.

DEAR DR. SHAW,

I NOW have authority, based upon a postal vote of the Gassiot Committee, to inform you that no objection is taken to the Matthew Gray Donation of £200 being applied to the payment of a seismological assistant for a third year at Eskdalemuir.

Believe me, &c.,
ROBT. HARRISON.

Dr. W. N. Shaw, F.R.S.

The Director was authorised, out of the sum set free by the provision for seismology for a third year, through Mr. Matthew Gray's benefaction, to accept Dr. Harker's offer of his De Dion car at cost price (Minute 395), and the following regulations for the use of the car by the observatory staff were approved :—

ESKDALE OBSERVATORY.

REGULATIONS FOR THE USE OF THE DE DION CAR PURCHASED JUNE, 1913.

1. For the use of the car 6*d.* a mile is to be paid to a car fund, of which 4*d.* is for running expenses, 1*d.* for sinking fund, and 1*d.* for chauffeur.

2. The observatory will pay whenever the car is used on observatory business, and for 1,000 miles in addition thereto for the Superintendent at his discretion.

3. The car is to be under the control of the Superintendent and the management of the fund will rest with him. It will probably make a journey to Langholm or Lockerbie once a fortnight, and those occasions will be used as far as the Superintendent may find it possible to afford opportunity for members of the staff or their belongings to go to market.

4. With the permission of the Superintendent members of the staff will be allowed to hire the car at the rate specified, but no one is to be allowed to drive the car without express permission.

5. The Committee does not undertake to replace the car if it becomes unserviceable.

It was further agreed that £90, remaining after the purchase of the car, be devoted to improving the land at the border of the observatory site, and planting it with trees after consultation with the Chamberlain and Forester of the Duke of Buccleuch.

405. Auxiliary Observatories.—**Falmouth** (Minute 396).—Submitted—the following memorandum and proposals which had been circulated to the Committee and approved, and had also been approved by Mr. W. L. Fox (with certain verbal alterations which were allowed) and by the Corporation of Falmouth. (M.O. 2986).

Proposed Experimental Work at Falmouth.

I beg leave to submit the following report of a visit to Falmouth, May 14–18, 1913. I had a number of interviews with Mr. Wilson Fox. I saw also the Corporation Meteorologist, who acts as observer for a station maintained to supply information to the Press; the coastguard in charge of the anemograph and the storm warning signals at Pendennis Castle; the Collector of Customs, who is the chief official at the Custom House where there is a frame for exhibiting the Daily Weather Report and the wind records from Pendennis.

The following notes represent the present situation :—

(1) *The Observatory.*—(*a*) *Magnetic Work.*—The appeal to the Royal Society Council for a grant from the Government Grant Funds has resulted in a grant of £150 for continuing the magnetic work till 30th June, 1913, but no longer. No information is available as to the action of the Council of the British Association upon the Resolutions passed by the General Committee at Dundee in favour of continuing the magnetic work at Falmouth until a new detailed magnetic survey of the British Isles is completed, and as it was clearly set out that in the absence of provision the work would come to an end on June 30th, it must be understood that no action means that the Council decline to give effect to the resolutions. A direct appeal to the Treasury by the Member of Parliament for Penryn and Falmouth has also failed. The Royal Cornwall Polytechnic Society has therefore accepted the position, and has given notice to the landlord of the adjacent land to terminate on 30th June, 1913, the tenancies held for the protection of the site. Building operations have already been begun on the land on the north side of the Observatory site.

Dr. Bauer, of the Carnegie Institution of Washington, has offered to lend an observer, and to contribute £50 for incidental expenses for the maintenance of the magnetic work for a further period of three months. The Society is willing to allow the observer the use of the instruments, provided that the Observatory can be placed in charge of some one acting for the Society. Mr. Phillips, who for some years has been acting as assistant at a salary of £50 a year, is willing to continue to work at the Observatory at that rate. The magnetic work may, therefore, continue till 30th September, but will come to an end at latest at that date. The magnetic hut will still be available unless the buildings on the adjacent plot interfere.

(*b*) *Meteorological Work.*—Mr. Kitto, the Superintendent observer, leaves Falmouth on 30th June. To continue, even for a time, the work of a First Order Station on the lines laid down in 1868, would necessitate the appointment of a successor. In 1880 the Meteorological Council were of opinion that work on those lines might then be discontinued, and since that time the urgent requirements of dynamical meteorology have pointed in other directions than the limited work of a First Order Station, particularly at present to the institution of an international network of stations for daily soundings of pilot balloons, which have been asked for through the official diplomatic channels by the International Commission for Scientific Aeronautics. The Committee would only be justified in continuing the work on its present lines for the sake of continuity if they could supplement it freely by other work. The available funds are limited to the grant of £250, and consequently the Committee cannot appoint another Superintendent on the terms of Mr. Kitto's appointment and with his duties. The work of the First Order Station in the form which it has taken since 1868 must therefore come to an end on 30th June.

In addition to the First Order Station the Observatory has kept up independent observations at 9h. local time and 21h. for the Royal Meteorological Society, a monthly summary of which appeared in the Society's Record and now appears in the Monthly Weather Report. The daily values of temperature, rainfall, and sunshine, are included in the "district values" of the Weekly Weather Report, and it is desirable that these should be continued; a set of readings should therefore be taken at 9 a.m. or 7 a.m. For the purposes of the Corporation a set of readings at 6 p.m. is required. These readings ought in any case to be provided in Falmouth, and the question to which my visit was devoted was whether these could be provided for in conjunction with special experimental work for the study of the phenomena of daily weather, including pilot balloon observations, cloud observations and cloud photography, by a meteorologist specially trained for the work, and spending part of his time at the Office and the rest at Falmouth or elsewhere.

The premises of the Observatory consist of a site about 90 ft. × 180 ft. bounded on the East, South, and West by roads, and on the North by open land, which will now apparently become small house property, together with buildings consisting partly of a dwelling-house (6 rooms with scullery), and partly of the Observatory proper (Office, photographic room, instrument room, library, anemograph room with access to square roof flat). There is, besides, a hut in the garden for absolute magnetic observations. The Observatory was provided by the Royal Cornwall Polytechnic Society in 1885 at a cost of £1,610. The premises are rated separately at £24 and £10 gross (£19 5*s*. and £8 net).

The Royal Cornwall Polytechnic Society is willing that these premises should be used by the Meteorological Office without any charge for rent, if the Office can arrange to use them for meteorological work, and will bear any incidental costs.

The suggestion which has been under consideration is that the Office should utilise the Observatory accommodation for experimental work in Meteorology, including pilot balloon soundings, cloud observations and cloud photography; to be carried on by one or more observers who would spend part of their time at Falmouth and part in London or elsewhere as directed. The work would be in direct connexion with the Forecast Division.

The extreme south-west of England is an important position for this kind of investigation, and being at the opening of the Channel, the position is also a good one for testing the practical value of the Office arrangements in connexion with the daily weather.

The working out of the suggestion requires accommodation for the observers who are for the time being on duty at Falmouth, and the maintenance of self-recording instruments which would be required as an indispensable auxiliary to the investigation, also regular daily observations of instruments at, say, 7h., 13h., and 18h. Accordingly this suggestion leads up to (1) the employment of a housekeeper to take care of the house and provide accommodation for one or occasionally two observers, and (2) the employment of an assistant who could keep a set of suitable self-recording instruments in operation. The work of the assistant would be similar to that of an observer at a telegraphic reporting station. According to the ordinary scale for that work the pay would be £31 15*s.* a year.

(2) *Meteorology for the Corporation.*—The Corporation of Falmouth is specially interested in Meteorology from the point of view of a health resort. The business of the town is to some extent being transformed from "shipping" to "visitors," and the local authorities are so far anxious to profit by the exceptional climate, as to wish for a 6 p.m. report of meteorological data to be communicated to newspapers with those from other health resorts, as shown on page 4 of the Daily Weather Report. As the Observatory has hitherto not found it practicable to supply the data, the Corporation has established a station of its own (the instruments, with the exception of the Jordan sunshine recorder, being loaned to them by the Falmouth Observatory Committee), and has attached the duties of observer to those of the Librarian of the Public Library.

It seems not only uneconomical, but undesirable, to have two independent meteorological organisations in the same town unless there is some definite purpose of comparison in view. The Corporation station does not comply in all particulars with the conventional conditions, and therefore, if observations are to be continued at the Observatory and the services of an assistant are to be retained, it would seem desirable for the Office observer and the Corporation observer to co-operate in observing the instruments, under the conditions of exposure which have provided official statistics for Falmouth since 1885. What would be required in order that the Observatory should adequately fulfil the wishes of the Corporation would be :

(i) Observations at 18h. similar to those received at the Office from other health resorts, and

(ii) A telephone to report the observations to the Post Office for transmission.

If a separate station were maintained at Falmouth for the Corporation, the Office would include the observations in its evening issues to the Press on conditions (1) that the costs of telegraphy of the reports to the Office were paid, and (2) that a contribution of £4 per annum is made for inspection The health resorts provide their own observer, and Falmouth already has observations, though the instruments and exposure are not orthodox. The arrangement suggested is that the Corporation observer should help the Office observer by acting as deputy on occasions, and that the Corporation should defray the cost of telegrams and pay the Office its £4. The Office would then instal a telephone at the Observatory to transmit the messages to the Post Office and generally to facilitate business.

(3) *The Anemograph and Signal Station at Pendennis Castle.*—The recording is at present unsatisfactory because the uninstructed Coastguard is unequal to the task of adjusting pens and making ink run. I found a special receiver containing a pool of ink that had dripped from the pen, and more used pens than I have ever seen together at once. To get good results some expert supervision is necessary. The station is a most important one, as hitherto the highest wind records of the three kingdoms have been obtained there. The state of the record is quite unsatisfactory. It is time that the anemometer was replaced by one which records direction as well as magnitude. This can be done either by band drive or direct drive. The anemometer standard is at the South angle of a look-out hut that stands on the top of the South tower of the Castle. It would be possible to erect a mast to carry a direction and velocity recorder on the top of the hut, if it had a sufficiently large base and the ties which are already in use.

The signals at the Castle include lanterns for night storm signals, and the opportunity for the practical consideration of storm signals by a member of the staff of the Forecast Division is most favourable.

(4) *The Exhibition of information at the Custom House.*—The Custom House is a very suitable place for exhibiting information. It is conveniently situated in the harbour, and is a good deal frequented by yachtsmen, sailors, and visitors, but the present mode of exhibition is shabby and discreditable. The case for the Daily Weather Report is too small, and the Report has to be doubled up in order to get it in. The case for the exhibition of the wind record shows thought on somebody's part, but it is now almost derelict. By the side of these stands a Fishery Barometer of the Life-Boat Institution, and its chart reasonably well kept. The Office Fishery Barometer, an excellent one, is in the long room of the Custom House itself.

It seems an excellent opportunity for displaying specimens of the four Office frames, for which some provision was made in this year's Estimates. There is a space 5 ft. 8 ins. between Grecian columns in front of the Custom House, where a board to carry the four frames could very well be set up. The Collector of Customs was quite agreeable to the board being erected for the purpose by the Office of Works. The four screens include two for the Daily Weather Report, one for the Fishery Barometer, and one for the Storm Signal Service. In place of the Storm Warning Telegram which goes to the Coastguard I should recommend the trial of a daily forecast. I should also recommend installing a wireless apparatus and taking in the forecasts from the Eiffel Tower, Norddeich, and Cleethorpes.

My inspection shows how necessary it is for the various phases of activity which are connected with the daily weather to be under the active supervision of some member of the Office staff if satisfactory results are to be obtained. It should be mentioned that to the passer-by the Observatory itself is distinguishable only as a house with a delightfully secluded garden, and would be unrecognisable except that there is a large tapered iron column rising from the roof flat with a cup-anemometer on it, and a Campbell-Stokes Sunshine recorder on a stand fixed to the roof railing. I should regard it as desirable for some public intimation to be given of the existence and purpose of the institution, and for opportunity to be given to the public to visit the Observatory under proper conditions and see the work that is carried on there.

The opportunity seems distinctly favourable for initiating experimental work in connexion with the Forecast Division, and for combining it with the public demonstration of the ways and means of the Forecast Division in relation to the supply of information to the public.

These considerations lead to the following recommendations :

1. That upon the termination of the present work of Falmouth Observatory on June 30th, the Meteorological Committee accept the offer of the Royal Cornwall Polytechnic Society of the use of the Observatory premises, rent free, for experimental meteorological work in connexion with the Forecast Division of the Office, on the understanding that the expenses of the work and of the up-keep of the premises are defrayed by the Office. The arrangements should be from year to year terminable by six months' notice to expire on 31st December.

2. That the Society provide and pay a housekeeper to look after the premises, a gardener to look after the garden.

3. That the sunshine recorder and raingauge be maintained in operation ; that the Office provide other suitable self-recording instruments as auxiliaries for the experimental investigation, and that the present observatory assistant be taken over by the Office at his present salary (until otherwise ordered) to look after the self-recording instruments, to take observations at 7h., 13h., and 18h. for the climatological reports and for telegraphic reports to the Office at 18h. for communication to the Press, and such other work of tabulation of instrument records as the Director may assign.

4. That the 6 p.m. observations be placed at the disposal of the Corporation and be transmitted to the Office for communication to newspapers on condition (*a*) that the Corporation defray the cost of the telegrams ; (*b*) That the Corporation observer share with the observatory assistant the duty of the observations ; (*c*) The Office will instal a telephone at the Observatory for the transmission of the reports to the Post Office or elsewhere.

5. That the distribution of accommodation in the Observatory building be so arranged that the present office, photographic room and instrument room be available for Office and laboratory purposes, and that provision be made for [two] sitting rooms and two bedrooms for the accommodation of observers.

6. That as a commuted sum for the outlay of the Society, the Office pay a retaining fee of £30 a year, and that during residence at the Observatory the first observer pay 10*s.* a week and the second 5*s.* a week for quarters, including service.

7. That the observers make their own arrangements with the housekeeper about their board, paying either the cost of the materials or a commuted sum for board, at their discretion.

8. That the experimental work consist in the first place of daily soundings with pilot balloons between 11h. and 13h., observations of clouds at 7h., 13h., 18h., photographs of clouds as a record of the conditions under investigation.

9. That the observer, during his residence, supervise and act as inspector for the instruments and observations at Falmouth, Pendennis, Scilly, Newquay and any other stations in Devon, Somerset and Cornwall ; and that it be also his duty to watch the Storm Signal Service and the Fishery Barometer Service in operation in the locality and to report upon them from time to time.

10. That application be made to the Office of Works for the erection of a board for the display of meteorological information at the Custom House at Falmouth, and that a display of information of importance to the locality be organised under the supervision of the observer. That the Office send a daily forecast for exhibition in the frame.

11. That a wireless receiving apparatus be installed at the Observatory and that the weather reports of the Eiffel Tower, Norddeich and Cleethorpes be taken in daily and telephoned for exhibition.

12. The observer will be stationed at Falmouth, in London or elsewhere, in accordance with the Director's order.

The financial arrangement would be as follows :—

	£
Commuted payment to the Royal Cornwall Polytechnic Society	30
Assistant	[50]
Daily Forecast Telegram	9
Telephone	7
	96

There would thus be £154 available out of the £250 for the payment of an observer and the expenses of pilot balloons, &c.

The new instruments with which it is proposed to equip the Observatory are :

1. Mercury barograph, which has been constructed by Mr. W. H Dines, and is ready for delivery.
2. Richard or Short and Mason thermograph.
3. Richard hygrograph.

These three replace the photographic recorders.

4. Ground thermometers—1 ft. and 4 ft.
5. Grass minimum thermometer.

It would be necessary for the anemometer at Pendennis to be replaced by one which records direction as well as velocity and this will cost a considerable sum. The Admiralty must be communicated with before anything can be done in this matter. It would be desirable for an expert to be on the spot while it is being done so that this should be taken up after the meteorologist begins work and meanwhile the Robinson be continued.

It would be desirable for work to be provided to fill the Assistant's time and make a more remunerative post if the Office work could thereby be relieved. This might be done by having the Pendennis anemograms tabulated before being sent up and the Scilly anemograms sent to Falmouth for tabulation, and by adding other work of a similar character.

W. N. SHAW.

21st May, 1913.

It was agreed that formal notice be sent to the Royal Society that the magnetic instruments at Falmouth provided out the Government Grant would not be in use after the completion of a comparison of the absolute instruments with those carried by Mr. L. F. Richardson, on a visit of inspection, and by Mr. W. Parkinson of the Carnegie Institution of Washington during the last week of June and the beginning of July.

406. Meteorological Office, Edinburgh.—Reported—that upon the receipt of the letter from the Treasury (Minute 402) acknowledging the communication of the allocation of the grant of £20,000 for the year 1913–14, including £350 for the Meteorological Office, Edinburgh, the first quarterly payment had been made on 2nd June, 1913, and that a meeting of the new committee had been summoned for 19th June at Edinburgh, which the Director had attended as Chairman.

A minute of proceedings at the meeting will be presented in due course.

The members of the Committee are —

The Director of the Meteorological Office, Chairman,
Mr. R. B. Greig, representing the Board of Agriculture for Scotland,
Mr. Patten Macdougall, C.B., Registrar-General for Scotland,

together with

Mr. Mackay Bernard, President,
Professor R. A. Sampson, Astronomer Royal for Scotland, and
Mr. E. M. Wedderburn, W.S., Honorary Secretary,

the three representatives appointed by the Scottish Meteorological Society.

407. International Conference at Paris on Radiotelographic Signals.—Submitted—the following communication (M.O. 2,439) from the Foreign Office, forwarding a copy of a letter from the French Ambassador to the Secretary of State for Foreign Affairs, and enclosing two copies of the official report of the Conférénce Internationale de l'Heure, held in Paris in October, 1912 (Minute 375) :—

M.O. 2,439.

The Under-Secretary of State for Foreign Affairs presents his compliments to the Director of the Meteorological Office, and, by direction of the Secretary of State, transmits herewith copy of the under-mentioned paper for his observations at as early a date as possible.

Foreign Office,
27th May, 1913.

Reference to Previous Letter :
From Meteorological Office, No. 2884/P. 19, 28th August, 1912.

Description of Enclosure.

Name and Date.	Subject.
French Chargé d' Affaires, 16th April, 1913.	Wireless Time Signals Conference, Paris, October, 1912.

(Similar letter sent to Admiralty, Board of Trade, India Office, Colonial Office, Post Office, and Treasury.)

Two copies of Paris report "Conference Internationale de l'Heure" enclosed.

Ambassade de France en Angleterre,
Londres,
le 16 Avril, 1913.

Monsieur le Secrétaire d'Etat,—

Le Président et le Secrétaire Général du Comité provisoire de la Commission internationale de l'heure, conformément au mandat qui leur a été conféré par la Conférence internationale de l'heure tenue à Paris au mois d'Octobre dernier, se sont adressés à Monsieur le Ministre des Affaires Etrangères de la République, par l'intermédiaire du Directeur du Bureau international de l'heure, Monsieur Baillaud, directeur de l'Observatoire en le sollicitant d'intervenir auprès des Gouvernements étrangers pour obtenir leur adhésion à la Commission internationale susvisée.

Ils ont en même temps prié Monsieur Pichon de faire parvenir à ces Gouvernements les procès-verbaux de la Conférence d' Octobre, dont je transmets cijoints vingt exemplaires à Votre Excellence, qui contiennent à la page 127 un projet de statut élaboré dans cette réunion.

D'autre part, suivant le désir exprimé par la Commission provisoire (Procès-Verbaux, p. 125), chaque Gouvernement devrait être invité à faire connaître, le plus tot possible aux autres Gouvernements les observations auxquelles le dit projet pourrait donner lieu de sa part et à désigner, après cet échange de vues, des délégués qui se réuniraient à Paris pour arrêter le texte définitif des règlements de la nouvelle Institution.

Monsieur le Ministre des Affaires Etrangères de la République a accédé volontiers à cette demande ; je suis en conséquence chargé de signaler cette double proposition à l'attention du Gouvernement Britannique et de lui suggérer que la réunion projetée ait lieu dans le courant du mois de juillet prochain.

En outre, et pour se conformer le premier à la procédure adoptée, le Gouvernement de la République a préparé les deux textes ci-joints, qu'il propose à l'adoption des autres Gouvernements. Sans apporter de modifications importantes dans la rédaction du projet de statuts voté par la Conférence, ainsi qu'en témoignent le projet et le contre-projet juxtaposés dans le document II. ci-annexé, le Gouvernement Français s'est borné à remanier l'ordre des articles dans le but de mieux grouper les dispositions du même ordre et à formuler expressément, dans l'article 16 du projet, in fine, une condition qui paraît devoir correspondre aux intentions des auteurs.

D'autre part il a paru nécessaire de réunir dans un acte diplomatique à part, suivant l'usage établi pour d'autres institutions internationales, les stipulations fondamentales qui doivent lier les Gouvernements entre eux et, par conséquent, ne pas être remises obligatoirement en question, devant les Assemblées générales qui, aux termes de l'article 13 du projet, doivent se réunir au moins tous les trois ans.

Tel est l'objet du projet de Convention internationale qui forme le document que Votre Excellence trouvera ci-annexé.

Les statuts constitueraient ainsi un complément de cet acte diplomatique, qui serait signé par les plénipotentiaires réunis au mois de juillet prochain.

Je serais reconnaissant à Votre Excellence, si Elle voulait bien me faire connaître dans le plus court délai possible, une limite de six mois ayant été fixée par les résolutions de la Commission provisoire en Octobre dernier, l'accueil que le Gouvernement de Sa Majesté aura jugé possible de réserver à ces diverses propositions.

Les vingt exemplaires ci-joints des procès-verbaux que je suis chargé de faire parvenir à Votre Excellence sont destinés : au Gouvernement Britannique, à l'Union Sud-Africaine, à l'Australie, au Canada, aux Indes Britanniques, à la Nouvelle-Zélande.

Veuillez agréer, &c.

Son Excellence (Signé) A. DE FLEURIAU.
Sir Edward Grey, Bart.

I.

PROJET DE CONVENTION INTERNATIONALE POUR LA CREATION A PARIS D'UNE COMMISSION INTERNATIONALE DE L'HEURE.

Les Gouvernements de
ayant jugé utile d'organiser une Commission internationale chargée de réaliser l'unification de l'heure, par l'envoi de signaux radiotélégraphiques ou autres, ont résolu de conclure un accord à cet effet et sont convenus de ce qui suit,

Références au projet de Statuts, élaboré par la Conférence de Paris (Octobre 1912.)

ARTICLE 1ER.

Voir Article 1er.

Les Hautes Parties contractantes s'engagent à fonder et à entretenir à Paris une Commission internationale de l'heure formée des Délégués des Gouvernement participants.

ARTICLE II.

Voir art 2, 3, 4, 5 *et* 6.

La composition de cette Commission et des organes qui en dérivent, à savoir : le Conseil permanent, le Comité et le Bureau international de l'heure, dont le siège est à Paris, leur fonctionnement et leurs pouvoirs sont déterminés par les statuts annexés à la présente Convention.

ARTICLE III.

Voir art. 7, 8 *et* 9.

Les frais d'installation, ainsi que les dépenses annuelles de fonctionnement et d'entretien de la Commission internationale et de ses organes, sont couverts par les contributions des Etats contractants établies dans les conditions prévues par les Statuts.

ARTICLE IV.

Voir art. 9.

Les sommes representant la part contributive de chacun des Etats contractants sont versées, par ces derniers, au commencement de chaque année, par l'intermédiaire du Ministère des Affaires Etrangères de la Rébublique Française, à la Caisse des Dépôts et Consignations, à Paris, d'où elles sont retirées au fur et à mesure des besoins, sur mandats du Directeur du Bureau international de l'heure.

ARTICLE V.

Voir art. 24.

Les Hautes Parties contractantes se réservent la faculté d'apporter, d'un commun accord, à la présente Convention, les modifications dont l'expérience montrerait l'utilité.

ARTICLE VI.

Voir art. 3.

Les Gouvernements qui n'ont pas signé la présente Convention sont admis à y adhérer sur leur demands. Cette adhésion sera notifiée par la voie diplomatique, au Gouvernement de la République Française et, par celui-ci, aux autres Gouvernements contractants ; elle comportera l'engagement de participer, par une contribution, aux frais de la Commission internationale et de ses organes, dans les conditions visées à l'article III.

ARTICLE VII.

La présente Convention sera ratifiée et les ratifications en seront échangées à Paris aussitôt que faire se pourra ; elle sera mise à exécution à partir de la date à laquelle le dépôt des ratifications aura été effectué.

ARTICLE VIII.

Voir art. 23.

La présente Convention est conclue pour une période de huit années à partir du 1er Janvier 1913. Après cette durée elle restera exécutoire pour des périodes successives de quatre ans entre les Etats qui n'auront pas notifié, six mois avant l'échéance de chaque période, l'intention d'en faire cesser les effets, en ce qui les concerne.

En foi de quoi les Soussignés, à ce dûment autorisés, ont arrêté la présente Convention qu'ils ont revêtue de leurs cachets.

Fait à Paris, le en un seul exemplaire qui restera déposé dans les Archives du Gouvernement de la République Française et dont des copies certifiées conformes seront remises, par la voie diplomatique, aux Parties contractantes.

II.

PROJET DE STATUTS.

*A. Texte élaboré par la Conférence de Paris (Octobre 1912).

ARTICLE 1er.

Il est créé une Commission Internationale de l'heure ayant pour objet l'unification de l'heure par l'envoi de signaux radiotélégraphiques ou autres qu'il s'agisse de signaux scientifiques de haute précision ou de signaux ordinaires, répondant aux besoins de la navigation, de la météorologie, de la sismologie, des chemins de fer, postes et télégraphes, des administrations publiques, horlogers, particuliers, etc.

ARTICLE 2.

Les organes de la Commission Internationale de l'heure sont :—

(*a*) l'Assemblée générale des Délégues ;
(*b*) le Conseil permanent ;
(*c*) le Comité ;
(*d*) le Bureau international de l'heure.

ARTICLE 3.

L'Assemblée générale se compose des délégués des Etats qui adhérent aux présents statuts et en donnent notification au Président, soit directement, soit, par l'intermédiaire du Ministère des Affaires Etrangéres de la République Française, à Paris.

ARTICLE 4.

Chaque Etat adhérent désigne lui-même celui de ses délégués qui jouit du droit de vote dans les cas prévus aux articles 13 à 16 inclus.

L'ensemble de ces délégués constitue le Conseil permanent.

ARTICLE 10.

La Commission élit son Président, son Vice-Président, son Secrétaire général, son Secrétaire, ainsi que le Directeur du Bureau International. Le Président, le Vice-Président, et les Secrétaires sont choisis parmi les membres du Conseil permanent. Les mandats de Président, de Vice-Président sont confrérés pour la durée comprise entre deux Assemblées générales ordinaires. Le Président et le Vice-Président ne sont rééligibles en la même qualité, qu'après un intervalle d'une année. Les fonctions de Président, de Vice-Président, et de Secrétaires ne peuvent être cumulées avec celles de Directeur du Bureau International de l'heure.

B. Texte proposé par le Gouvernement français.

ARTICLE 1er.

(Article 1er du projet de la Conférence.)

ARTICLE 2.

Les organes de *la nouvelle Institution* (*) sont :
(*a*) *la Commission internationale* ;
(*b*) le Comité [?Conseil] permanent ;
(*c*) le Comité ;
(*d*) le Bureau international de l'heure.

ARTICLE 3.

La Commission internationale se compose de l'Assemblée générale des délégués des Etats qui adhèrent à la Convention.

(*Voir pour les notifications d'adhésion l'article VI. du projet de Convention*).

ARTICLE 4.

(Article 4 du projet de la Conférence.)

ARTICLE 5.

(Article 10 du projet de la Conférence.)

* Translated on pp. 305-307 of these Minutes.

* Les modifications au projet de la Conférence sont soulignées.

A. Texte élaboré par la Conférence de Paris (Octobre 1912).

ARTICLE 11.

Le Comité se compose du Président, du Vice-Président, des Secrétaires et du Directeur du Bureau international.

ARTICLE 12.

En cas de vacances parmi les membres du Comité, le remplacement provisoire est fait par le Conseil permanent, par voie de correspondance ou, s'il le faut, en séance par ce Conseil convoqué à cette fin.

ARTICLE 6.

Le Bureau international comprend outre le Directeur :—

1°. Des Collaborateurs scientifiques nommés et révoqués par le Comité sur la proposition du Directeur du Bureau international ; ils sont chargés, avec ou sans indemnités, d'études spéciales et determinées. Leur mandat n'excède pas deux années ; il peut être renouvelé ;

2°. Des Assistants scientifiques et des Aides, nommés et revoqués par le Directeur du Bureau international. Ils sont chargés des travaux figurant au programme arrêté par le Conseil permanent. Leur mandat n'excède pas quatre années et peut être renouvelé.

Le Budget détermine le montant des sommes allouées pour chacune des catégories de ce personnel.

ARTICLE 5.

Le Bureau international de l'heure a pour objet :

1° Pour ce qui touche les signaux ordinaires, de centraliser les résultats des déterminations de l'heure universelle, exprimée en temps de Greenwich, qui lui seront transmis par les centres horaires nationaux, chargés eux-mêmes de calculer, de la manière la plus exacte, l'heure moyenne, déduite des déterminations faites par les observatoires de leur propre pays.

2° Pour ce qui regarde les signaux scientifiques de centraliser les déterminations de l'heure faites dans les observatoires associés et d'en déduire l'heure la plus exacte.

Le Bureau international de l'heure publie les résultats de ses comparaisons. Pour ceux de ces résultats qui ne seraient pas promptement publiés, il les communique au Bureau central de l'Association géodésique internationale à Potsdam, en vue des discussions approfondies que ce Bureau jugerait utile d'entreprendre.

Il les communique également aux autres associations officielles qui les demanderaient.

Le siège du Bureau international de l'heure est établi à Paris.

ARTICLE 13.

L'Assemblée générale se réunit au moins tous les trois ans, sur convocation de son Président. Cette convocation précède de trois mois au moins la réunion et porte l'ordre du jour de la session.

Pour les questions d'ordre scientifique, les décisions sont prises à la majorité des voix de tous les déléqués ; pour les questions d'ordre administratif ou d'ordre mixte, le vote a lieu par Etat dès qu'un membre du Conseil permanent en fait la demande.

B. Texte proposé par le Gouvernement français.

ARTICLE 6.

Le Comité se compose du Président, du Vice-Président, *du Secrétaire général, du Secrétaire* et du Directeur du Bureau international.

ARTICLE 7

(Article 12 du projet de la Conférence.)

ARTICLE 8.

(Article 6 du projet de la Conférence.)

ARTICLE 9.

Le Bureau international de l'heure, *dont le siège est fixé à Paris*, a pour objet :

(*Le reste comme dans l'article 5 du projet de la Conférence, sauf l'indication du siège du Bureau, qui est placée en tête de l'article.*)

ARTICLE 10.

La Commission internationale se réunit au moins tous les trois ans, en Assemblée générale, sur convocation de son Président. Cette convocation précède de trois mois au moins la réunion et porte l'ordre du jour de la session.

Pour les questions d'ordre scientifique, les décisions sont prises à la majorité des voix de tous les délégués ; pour les questions d'ordre administratif ou d'ordre mixte, le vote a lieu par Etat dès qu'un membre du Conseil permanent en fait la demande.

En cas de partage des voix, celle du Président est prépondérante.

(Dernier paragraphe de l'article 16 du projet de la Conférence).

A. Texte élaboré par la Conférence de Paris (Octobre 1912).

ARTICLE 14.

Un tiers des Etats a le droit de requérir du Président la convocation d'une assemblée générale extraordinaire, en indiquant l'ordre du jour à soumettre à l'assemblée.

ARTICLE 15.

Pour qu'une décision soit valable, il faut que la moitié au moins des Etats adhérents ait pris part au vote.

Pour les questions non portées à l'ordre du jour de la convocation du Président, aucune décision ne peut être prise si elle n'est approuvée par un nombre d'Etats au moins égal à la moitié du nombre des pays adhérents.

ARTICLE 16.

Les Etats adhérents qui n'ont pas envoyé de délégué à une assemblée peuvent conférer leur droit de vote à l'un des délégués présents, sans toutefois qu'une même personne puisse disposer de plus de trois voix.

Lorsque la cotisation annuelle entière est versée par une corporation savante, c'est le délegué de celle-ci qui jouit du droit de vote comme représentant de l'Etat auquel appartient cette corporation.

En cas de partage des voix, celle du Président est prépondérante.

ARTICLE 17.

Pour l'examen de certaines questions, l'assemblée pourra constituer des commissions spéciales. Tous les délégués peuvent assister aux séances de ces commissions.

Le Président peut inviter à assister aux séances des personnes étrangères à la commission.

ARTICLE 18.

Dans l'intervalle de deux assemblées générales, l'execution des décisions et la gestion des affaires administratives sont confiées au Comité.

Pour les affaires administratives non prévues, le Comité prendra, par correspondance, l'avis du Conseil permanent.

ARTICLE 19.

Le Conseil permanent établit lui-même son règlement d'ordre intérieur.

ARTICLE 20.

La correspondance addressée par la Commission aux Etats adhérents est signée par le Président et le Secrétaire Général.

Pour les questions d'ordre scientifique, le Directeur du Bureau international correspond directement avec les délégués des Etats, avec les centres nationaux émettant des signaux horaires ou s'occupant des observations et des calculs relatifs à ces signaux, et avec les sociétés savantes ou les particuliers qui lui demanderaient des renseignements.

ARTICLE 21.

Le Secrétaire général présente à chaque Assemblée générale un rapport sur la situation de la Commission ; il publie les procès-verbaux des séances des assemblées, ainsi que les résultats des travaux exécutés conformément aux décisions de la Commission. Il est chargé de la correspondance et s'occupe, sous la direction du Président, des affaires courantes ne rentrant pas dans les attributions du Directeur du Bureau international.

B. Texte proposé par le Gouvernment français.

ARTICLE 11.

(Article 14 du projet de la Conférence).

ARTICLE 12.

(Article 15 du projet de la Conférence).

ARTICLE 13.

Les Etats adhérents qui n'ont pas envoyé de délégué à une assemblée peuvent conférer leur droit de vote à l'un des délégués présents, sans toutefois qu'une même personne puisse disposer de plus de trois voix.

Lorsque la cotisation annuelle entière est versée par une corporation savante, c'est le délégué de celle-ci qui jouit du droit de vote comme représentant de l'Etat auquel appartient cette corporation *et avec l'assentiment de cet Etat.*

(*Le dernier paragraphe ci-contre est reporté a l'article* 10).

ARTICLE 14.

(Article 17 du projet de la Conférence).

ARTICLE 15.

(Article 18 du projet de la Conférence).

ARTICLE 16.

(Article 19 du projet de la Conférence).

ARTICLE 17.

(Article 20 du projet de la Conférence).

ARTICLE 18.

(Article 21 du projet de la Conférence).

A. Texte élaboré par la Conférence de Paris (Octobre 1912).

ARTICLE 22.

Le Directeur du Bureau international présente chaque année, au Président, un rapport embrassant tout le champ d'activité de ce Bureau. Il doit aussi lui soumettre le programme des travaux à exécuter l'année suivante. Ce rapport annuel, et le programme des travaux, sont imprimés et envoyés à tous les délégués des Etats adhérents.

ARTICLE 7.

Les Etats adhérents s'engagent à faire verser au Bureau international de l'heure dont il est parlé ci-dessus, soit par leur Gouvernement, soit par une de leurs corporations savantes, la cotisation annuelle fixée à l'article 8.

ARTICLE 8.

Les cotisation annuelles sont établies au prorata du chiffre de la population des Etats, d'aprés le barême suivant :

a) L'Etat dont la population est inférieure à cinq millions d'habitants verse une cotisation annuelle de 400 fr. ;

b) L'Etat dont la population est comprise entre cinq et dix millions d'habitants verse une cotisation annuelle de 800 fr. ;

c) L'Etat dont la population est comprise entre dix et vingt millions d'habitants verse une cotisatiou annuelle de 1,200 fr. ;

d) L'Etat dont la population est supérieure à vingt millions d'habitants verse une cotisation annuelle de 2,000 fr.

ARTICLE 9.

Les sommes versées par les Etats, ainsi que les recettes d'autres provenances, sont employées :

a. A couvrir les frais d'administration et de publication ;

b. A solder l'indemnité du Secrétaire général de la Commission et du Directeur du Bureau international de l'heure ;

c. A payer des subventions ou rénumérations dues, soit pour des travaux de calculs et d'observations, soit pour des expériences ordonnées par la Commission ;

d. A pourvoir aux dépenses nécessitées par l'achat et l'entretien du matériel du Bureau international de l'heure.

La répartition des crédits affectés à ces différents objets est réglée par le Conseil permanent.

L'emploi des sommes ainsi attribuées est fait sous la responsabilité du Directeur du Bureau international de l'heure et sous le contrôle du Conseil permanent.

Tous les paiements sont ordonnés par le Directeur du Bureau international de l'heure, sur mandat du Président.

La justification des dépenses et l'état des recettes sont oubliés dans les procès-verbaux des séances de la Commission.

Les sommes non employées sont portées à l'actif du budget de l'année suivante et affectées aux dépenses de cette année.

ARTICLE 24.

Toute modification aux présents statuts devra être votée par l'Assemblée générale dans les conditions prévues aux articles 13 à 16 inclus.

B. Texte proposé par le Gouvernment français.

ARTICLE 19.

(Article 22 du projet de la Conférence.)

ARTICLE 20.

Les Etats adhérents s'engagent à faire verser au Bureau international de l'heure dont il est parlé ci-dessus, soit par leur Gouvernement, soit par une de leurs corporations savantes, la cotisation annuelle fixée *à l'article suivant*.

ARTICLE 21.

(Article 8 du projet de la Conférence).

ARTICLE 22.

(Article 9 du projet de la Conférence).

ARTICLE 23.

Toute modification aux présents statuts devra être votée par l'Assemblée générale dans les conditions prévues aux articles 9 à 12 inclus.

Remplacé par l'article VIII. du projet de Convention.

B.—Submitted further—the following letter (M.O. 1,195) from the Admiralty, forwarding a copy of a report on the proceedings at Paris, by the British delegates :—

Admiralty, S.W.,
12th March, 1913.

SIR,—

I AM commanded by my Lords Commissioners of the Admiralty to transmit herewith, for the information of the Meteorological Committee, a copy of a report on the proceedings of the International Conference held at Paris in October last to consider the question of the transmission of weather reports and time signals by wireless telegraphy, which has been received from the Astronomer Royal; Captain J. F. Parry, R.N., Assistant Hydrographer of the Navy; and Commander Arthur Silvertop, R.N., of H.M.S. "Vernon," who attended the Conference as British delegates.

2. It is presumed that the proposals as to the creation of a "Commission Internationale de l'Heure," with an executive body under it to be called the "Bureau Internatonal de l'Heure" having headquarters at Paris, will be made officially by the French Government to the other Governments concerned, and will then be circulated by the Foreign Office (with the printed reports of the proceedings) to the different Government Departments of State likely to be interested.

3. A copy of the Report has also been sent to the Treasury, Foreign Office, Colonial Office, India Office, Board of Trade, General Post Office.

I am, &c.,
W. GRAHAM GREENE.

The Director,
Meteorological Office.

Admiralty, S.W.,
20th January, 1913.

SIR,—

* * * * * * * *

WE have the honour to report that we attended the "Conference Internationale de l'Heure," held at Paris between the dates of October 15th and October 25th. The programme of the work to be undertaken by the Conference . . . . was dealt with by four distinct Commissions. The Reports of these Commissions are attached herewith in the original,* with the essential portions in translation (*see* Enclosure 2). These Reports were agreed to by ourselves and by the other delegates, but in doing so no obligation was imposed on the British Government, and they are now presented as proposals to be submitted for consideration.

Presumably the Official Report will be forwarded by the French Government, but in the meantime we have the honour to submit herewith our remarks and recommendations on the Reports of the four Commissions of the "Conference Internationale de l'Heure" (*see* Enclosure 1), observing that in preparing them we had the advantage of the collaboration of Dr. Shaw, Director of the Meteorological Office, who, as one of the British delegates at Paris, attended the meetings of the British delegates by their Lordships' invitation, and we therefore beg to recommend that Dr. Shaw be furnished with a copy of this Report for communication to the Committee of the Meteorological Office.

We have, &c.,
(Signed) F. W. DYSON, Astronomer Royal.
J. F. PARRY, Captain, R.N., and Assistant Hydrographer.
ARTHUR SILVERTOP, Commander, R.N., H.M.S. "Vernon."

The Secretary,
Admiralty.

ENCLOSURE I.

Containing the remarks and recommendations of the British delegates at the "Conférence Internationale de l'Heure" on the reports of the Four Commissions.

1ST COMMISSION.

The results obtained by the various methods of time determination are of technical interest only and do not call for any special comment.

2ND COMMISSION.

(Paragraph 1.)

From the point of view of the reception of time signals by ships, the automatic registration of time signals is not required, but it would be of great advantage to the observatories, and it is desirable that the Royal Observatory, Greenwich, should be placed in a position to carry this out.

(Paragraph 2.)

Although four daily time signals were agreed to as a maximum, it was none the less considered that, in principle, two signals every 24 hours would be sufficient.

(Paragraph 3.)

In the absence of instructions on this point we did not consider ourselves empowered to state that any stations in the British Empire would be available for the emission of time signals, but we now wish to draw attention to the desirability of co-operating with other countries in this work.

This purpose could most usefully be served by the British Government, in the present circumstances, by the transmission of time signals from the following stations, even though only of limited range, where both observatories and wireless telegraph stations already exist, viz. :—Cape Town, Colombo, and Hong Kong.†

* Original reports retained at Admiralty.

† Note added at Admiralty.—This must be assumed to refer to the proposed Colonial Station at Hong Kong as the station on board H.M.S. "Tamar" will not be available for the purpose.

It is also considered that if co-operation of the Commonwealth of Australia and the Dominion of New Zealand could be obtained in this scheme, an area which would otherwise be untouched by other nations would be open for the reception of time signals.

It will be observed in the list of stations given in Paragraph 3, that Paris and Norddeich will, after July 1st, 1913, emit time signals at 10 a.m. and 10 p.m. respectively.

* * * * * * * *

(Paragraphs 5 and 6.)

In the event of the general concurrence in the proposals for the method of sending radio-telegraphic time signals, and the wave length to be employed, contained in these paragraphs it is suggested that due notification be given—

(*a*) To H.M. ships.

(*b*) To the maritime world by an Admiralty notice to mariners.

3RD COMMISSION.

The question of the exactitude of time signals is of technical interest only, and calls for no special comment.

4TH COMMISSION.

(Section "A.")

Briefly, this is a suggestion for the creation of a "Bureau International de l'Heure," having its centre at Paris.

A sub-commission on this subject was held, whose projected statutes are attached.

It will be seen by paragraph 8 of the said statutes that the proposal involves an annual contribution of £80 by the British Government.

The constitution of this "Commission de l'Heure," with a bureau at Paris, will secure permanency, accuracy and uniformity of signals transmitted from different wireless stations, which will be of undoubted benefit to navigators and to exploring and surveying parties on land; and the comparisons of time, as determined at different observatories, will be of considerable scientific value, and cannot fail to improve the methods and precision of time determinations. It is therefore submitted that it would be desirable for the British Government to agree to participate in the scheme.

(Section "B.")

Communication with the International Association of Academies calls for no comment from us.

(Section "C.")

This section implies the creation of an international organisation of a dual character:—

(1) On the one hand for the collection of observations from ships and their distribution to the meteorological institutes (one or more in each State).

(2) On the other hand, for the issue of reports or forecasts from the radio-telegraphic stations to ships.

At present, in the Eastern hemisphere, only the British office collects meteorological observations by radio-telegraphy from ships; but weather messages are issued from the Eiffel Tower (French), Norddeich (German), Cleethorpes (British) and local information about weather can be got by ships on application to the Post Office stations.

The creation of a common international system cannot well be completed by July, 1913. The discussion of the question from the point of view of meteorological administration is intended to take place at Rome in April, 1913, when the International Meteorological Committee (a permanent body) is to meet. It will then, presumably, receive the report proposed in paragraph 5 of Section "C." It has already a proposal by one of the United States delegates at the radio-telegraphic Conference for compulsory transmission of observations at *Greenwich noon from* ships *to* London and Washington, and *for* the issue of forecasts *from* these centres.

The following are some of the questions which will probably require the consideration of the International Meteorological Committee:—

(*a*) What should be the form of international weather signal? Is the Cleethorpes form, the Norddeich form, or the Washington form best suited to British ships in view of the differences of language? Can an international organisation satisfy all requirements?

(*b*) At what time and by what stations should the weather signals be sent?

(*c*) On what wave length should the weather signals be sent?

On these matters we beg to express the following opinions:—

(*a*) That it is desirable to create an international organisation for the collection and supply of weather information by radiotelegraphy, as indicated in Section "C" of the 4th Commission's report.

The difficulty of diversity of languages should be avoided by the adoption of an international figure code whether for observation or forecast.

(*b*) The international weather signal would follow immediately on the international time signal at the selected stations from which both are sent.

(*c*) The wave length should be uniform with that adopted for time signals (2,500 metres).

* * * * * *

We further express the opinion that it is desirable to have wireless receiving apparatus at the Chief Observatories of the Meteorological Office with a view to taking part in the international study of atmospheric interference.

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* Retained at Admiralty.

Section "D."

(Paragraph 1).

It is recommended that the proposal to instal an apparatus for receiving radiotelegraphic signals in all ships be sent to the Board of Trade for consideration, observing that the receiving apparatus referred to can be installed at very small cost, and that if a universal wave length for Time Signals is adopted, as now suggested in paragraph 6 of the report of the 2nd Commission, the signals could usually be received by any officer with very slight practical training.

(Paragraph 2).

The subject referred to is the general question of the notification by Radiotelegraphy from some important distributing centre of the presence of Ice, Derelicts and other Navigational Dangers, which affect the Trade Routes of the North Atlantic Ocean.

This matter had already been the subject of discussion between the Hydrographer of the Navy and the United States Hydrographer ; and, with a view to bringing it directly before the Conference, we specially conferred with the Delegates of the United States on the subject.

It was agreed that it was sufficient for the purpose to call attention to the matter, with the object of having it placed on the records of the "Conference Internationale de l'Heure."

SECTION "E."

The scientific study of Hertzian Waves calls for no remarks from us.

(Signed) F. W. DYSON, Astronomer Royal.
" J. F. PARRY, Captain R.N., Assistant Hydrographer.
" ARTHUR SILVERTOP, Commander R.N. H.M.S. "Vernon."

ENCLOSURE 2.

Containing :—

(*a*) Work to be undertaken by the Conference.
(*b*) Reports of the four Commissions of the Conference with the essential portions in translation.
(*c*) Reports of the Provisional Committee with the Projected Statutes drawn up by that body.

The Commission submit the following proposals for the approval of the International Conference :—

1ST COMMISSION.

The results furnished by the different methods and the different instruments at present in use for the determination and keeping of Time, shall be transmitted to the centre which will be created for the discussion of all questions relative to Time and their bearings on Astronomy and Geodesy.

2ND COMMISSION.

1. Observatories and Administrations affected are to study the means of organising and the automatic registration of Time Signals.

2. It is desirable that in every part of the globe it may be possible to receive, without fail, a night Time Signal and a day Time Signal, the number of such Time Signals not exceeding four in every 24 hours.

3. The study of the final distribution of centres for the emission of signals is to be allocated to the "Commission Internationale de l'Heure."

The following list gives the Stations which will probably be ready on July 1st, 1913, to act as centres for sending out Time Signals, and the hours at which those Signals should be made.

	Greenwich Time.
Paris	0 h. (Midnight)
Brazil (San Fernando)	2 h.
United States (Arlington)	3 h.
Mogadiscio (Somaliland)	4 h.
Timbuctoo	6 h.
Manila	8 h.
Paris	10 h.
Norddeich	12 h.
Brazil (San Fernando)	16 h.
United States (Arlington)	17 h.
Massaouah (Erythrea)	18 h.
San Francisco	20 h.
Norddeich	22 h.

Every Time station other than the preceding, which may hereinafter be brought into existence should only make its signals at exact hours (Greenwich Time) different from the foregoing.

Note.—(Added by consent of Conference). Stations which are beyond the range of the foregoing may, however, transmit at the same times.

4. The "Commission Internationale de l'Heure" will have the duty of regulating the issue of special signals for scientific purposes, especially those which have as an object the carrying out in practice of the unification of Time Standards.

5. Ordinary Time Signals will be uniformly sent in conformity with the attached scheme (See diagram "B").

6. The centres for sending out Time Signals will adopt a uniform wave length of about 2500 metres. When they employ a musical note its tone should be chosen in such a manner as to be, so far as is possible, free from interference.

3RD COMMISSION.

1. As regards the exactitude necessary for Astronomy and Geodesy, Radiotelegraphic Time Signals should reach the highest possible degree of precision.

2. As regards Navigation the signals at present in use may be considered as sufficiently accurate.

3. For Meteorology, Terrestrial Magnetism and Seismography an approximation to the nearest half second is at present sufficient. If in the future modifications have to be introduced into the present system, it is desirable that precision within a half second or even a quarter of a second should be guaranteed and that the system of Time Signals should be sufficiently simple for these signals to be taken in by comparatively unskilled observers.

4. For the needs of Railways and the Public Services the Signals at present in use may be considered as sufficiently accurate.

4TH COMMISSION.

(A) Creation of a "Commission Internationale de l'Heure".—

I. It is desirable to give effect to the unification of Time Standards by the issue of Radiotelegraphic Signals, whether ordinary or scientific signals (See report of 2nd Commission, paragraphs 4 and 5).

II. Universal Standard Time to be that of Greenwich.

III. It is desirable to create a "Commission Internationale de l'Heure" in which each State taking part in the scheme will be represented by delegates.

IV. It is desirable to create under the authority of the "Commission Internationale de l'Heure" an executive body to be called the "Bureau International de l'Heure," whose headquarters will be at Paris.

V. For ordinary signals the results of the determinations of Time will be forwarded to the foregoing Bureau by the centres belonging to the various nations. These centres will, in their turn, collect the determinations made by various observatories in their own countries.

VI. For the purpose of scientific signals, it will be the duty of the Bureau to collect determinations of Time made in associated observatories and to deduce the most accurate Time from them.

VII. The "Bureau International de l'Heure" will communicate the results of those comparisons which cannot be published immediately, to the "Bureau Central de l'Association Geodesique Internationale" at Potsdam, asking that body to undertake a detailed investigation of them. These results will also be forwarded to any of the other official international associations which may require them.

VIII. Until such time as circumstances permit of the realisation of this programme, a Commission, nominated by the Conference should organise, experimentally, the co-operation implied, and might study improvements of every kind which could be introduced into the programme before it is officially submitted for the approval of the Governments concerned.

(B) Communication with l'Association Internationale des Academies :—

The Conference begs the "Academies des Sciences" to be good enough to recommend to the "Association Internationale des Academies" the project of creating a "Commission Internationale de l'Heure," conformably to the wish expressed by the said "Association Internationale" which assembled in London in 1904.

(C) Meteorology :—

Questions concerning the relation of Meteorology and Radiotelegraphy are of three kinds :—

1. The issue by one or more Radiotelegraphic stations of Meteorological information intended for stations at a distance whether on land or on board ship.
2. The collection by one or more Radiotelegraphic stations of observations coming from distant stations on land or at sea, and their transmission to the Central Meteorological Institutes.
3. The study of meteorological phenomena which affect the transmission of Radiotelegraphic signals.

The foregoing questions are too complicated for immediate discussion. It is desirable that the consideration of them should be entrusted, in the first instance, to a commission composed principally of Meteorologists and Directors of Radiotelegraphic stations. This commission should present a report at the next assembling of the "Comité Météorologique International."

1. In the meantime it is recommended that the number of meteorological stations whose observations are included in the Eiffel Tower signal, be increased as much as possible.
2. The collaboration of the Radiotelegraphic station under construction at Laeken in the study of Radiotelegraphic disturbances produced by atmospheric agencies, will be welcomed.

(D) Navigation :—

1. It is desirable that all vessels either sailing or steam be provided at an early date with apparatus for receiving radiotelegraphic Time Signals.
2. The Conference notes the communications exchanged between the delegates of the United States and those of Great Britain on the subject of the information to be transmitted by Radiotelegraphy concerning Icebergs and other navigational dangers. It recognises the importance of the agreement which has been arrived at in the general interests of navigation by those Delegates on this matter.

(E) Scientific study of Hertzian waves.

The Conference takes note of the constitution of a private Commission having as an object the study of Hertzian waves and their relation to local and varying surroundings.

It congratulates M. Goldschmidt, who is willing to place his high power station at Brussels at the disposal of this Commission, together with a sum of 25,000 francs towards the expenses of the initial investigations.

The Conference expresses a wish to see reseaches of this kind encouraged by public authorities, as the results promise to be of great importance not only from the point of view of theoretical Physics and Meteorology but also from that of the development of Radiotelegraphy.

It is hoped that the Radiotelegraphic station at Brussels, although created for the public service, should, nevertheless, be enabled to contribute in the future towards these International scientific researches.

REPORT OF THE 2ND SITTING, 24TH OCTOBER, 1912.

The Provisional Committee turned its attention to the project elaborated by . . . . . After a short discussion that project was unanimously adopted by all members actually present or represented (by deputies) under certain reservations made by the German delegate with regard to Articles 8, 9, and 23.

The Commission authorised its Committee to carry out all necessary formalities with regard to the creation of the Commission Internationale de l'Heure and the Bureau International de l'Heure.

The Committee was ordered to request the Ministry of Foreign Affairs of the French Republic, through Mons. Baillaud, Director of the Bureau International de l'Heure, to transmit the enclosed projected statutes to the various Governments affected, asking them to forward any observations which the projects might cause them to make. It was further to be announced to the various Governments that a reassembling of the delegates of the various States would be convoked at Paris, after an interval of about six months, to draw up the statutes in their final form and to give due consideration to any observations which may have been submitted in the interim. All such observations will be communicated to the Governments concerned, together with a notice of the convocation of the above-mentioned reassembling of delegates.

The attention of the various Governments was to be drawn to the fact that their colonies might be considered recognised independent States, and in consequence might adhere to the Commission Internationale de l'Heure in the manner uniformly followed by other international associations with scientific objects.

The general principles which the Radiotelegraphic Conference at London in June, 1912, elaborated in reference to the above will be again adopted in organising the participation of the above-mentioned colonies in the Commission Internationale de l'Heure, and in defining their rights with regard to voting.

The members of the Provisional Commission appointed at Paris by the Conférence Internationale de l'Heure at its full sitting of October 23rd, 1912, accept this mission with the reservation that it be subject to the approval of their respective Governments, and are unanimous in proposing that the foregoing projected statutes be submitted for the consideration of the various States concerned.

PROVISIONAL COMMITTEE.

Preliminary.

At the full sitting of the Conference, on October 23rd, 1912, the Conférence Internationale de l'Heure adopted the reports of these Commissions and approved of the creation of a Provisional Commission, composed of one delegate from each State represented. The duty of this Commission was to consider the best and quickest means of carrying out the resolutions of the Conference.

Note.—The Provisional Commission Internationale de l'Heure, constituted as above, held three full sittings on October 23rd, 24th, and 25th, and drew up the scheme of projected statutes given in the annex.

PROJECTED STATUTES.

(Drawn up in October, 1912.)

1. A Commission Internationale de l'Heure is created, having for object the unification of Time by the emission of radiotelegraphic or other signals, be those signals *scientific signals of great accuracy* or *ordinary signals*, answering to the needs of navigation, meteorology, seismology, railroads, posts and telegraphs, public offices, watchmaking establishments, private individuals, &c.

2. The organs of the Commission Internationale de l'Heure are :—

(*a*) The General Assembly of Delegates.
(*b*) The Permanent Board.
(*c*) The Committee.
(*d*) The Bureau International de l'Heure.

3. The general assembly is to be composed of the delegates of the various States who adhere to these statutes and notify their adherence to the President, either directly or through the Ministry for Foreign Affairs of the French Republic, at Paris.

4. Each State included in the scheme is to appoint the particular delegate who has the right of voting under the circumstances foreseen by Articles 13 and 16.

The body formed by all these latter delegates constitutes the *Permanent Board.*

5. The Bureau International de l'Heure has the following duties :—

(1) With regard to *ordinary signals* : of centralising the results of any such determination of Time, expressed in Greenwich Time, as may be transmitted to it by national centres, who, in their turn, have the duty of calculating mean time as accurately as possible and of deducing it from the determinations made by the observatories of their own countries.
(2) With regard to *scientific signals* : of centralising determinations of Time made by associated observatories and of deducing therefrom the most accurate Time.

The Bureau International de l'Heure is to publish the results of its comparisons. Such results as are not promptly published are to be communicated to the Central Bureau of the Association Géodesique Internationale in view of the detailed investigations of them which that Bureau might consider it useful to undertake. It will also communicate them to any other official associations which may demand them.

6. Besides the Director, the Bureau International is composed of :—

(1) Scientific Collaborators nominated by the Committee on the proposition of the Director of the Bureau International. They have the duty of pursuing special lines of investigation with or without payment. Their appointment is not to exceed two years, but may be renewed.

(2) Scientific Assistants and Sub-assistants, nominated by the Director of the Bureau International. Their duty is to be in connection with the work enunciated in the programme drawn out by the Permanent Board. Their appointment is not to exceed four years, but may be renewed.

7. The States adhering to the scheme bind themselves to pay into the aforesaid Bureau International de l'Heure the annual subscription fixed by Article 8, either through their Governments or through one of their own learned associations.

8. The annual subscriptions are fixed in proportion to the population of the various States, on the following scale :—

(*a*) The State whose population is below 5,000,000 inhabitants is to pay an annual subscription of 400 francs ;

(*b*) The State whose population is between five and ten million inhabitants is to pay an annual subscription of 800 francs ;

(*c*) The State whose population is between ten and twenty million inhabitants is to pay an annual subscription of 1,200 francs ;

(*d*) The State whose population is above 20,000,000 inhabitants is to pay an annual subscription of 2,000 francs.

9. The sums paid in by the various States, together with the receipts arising from other sources, are to be employed :

(*a*) In covering the expenses of administration and publishing ;

(*b*) In paying the salaries of the general secretary of the Commission and of the Director of the Bureau International de l'Heure ;

(*c*) In paying the subsidies and remunerations due either for work in connection with calculations and observations or for experiments ordered by the Commission ;

(*d*) To provide for the expenses incurred in the purchase and upkeep of the material required by the Bureau International de l'Heure.

The distribution of the sums appropriated for these different purposes is to be regulated by the Permanent Board.

The employment of the sums so distributed is at the responsibility of the Director of the Bureau International de l'Heure and under the control of the Permanent Board.

All payments are to be sanctioned by the Director of the Bureau International under the orders of the President.

Statements of the expenses incurred and of the sums received are to be published in the official reports of the sittings of the Commission.

Sums not employed are to be carried over to the funds of the next year's estimates and distributed over the expenses of that year. The Commission is to elect its President, Vice-President, Secretary-General and Secretary as well as the Director of the Bureau International. The President, Vice-President and the Secretaries are to be chosen from the members of the Permanent Board.

Appointments to the Presidency and Vice-Presidency are conferred for such length of time as may elapse between two ordinary General Assemblies. The President and Vice-President are only re-eligible for the same positions after an interval of a year. The functions of the President and Vice-President and the Secretaries cannot be combined with those of the Director of the Bureau International de l'Heure.

11. The Committee is to be composed of the President, the Vice-President, the Secretaries and the Director of the Bureau International de l'Heure.

12. In the event of the members of the Committee being away upon their holidays a temporary substitute can be arranged for by the Permanent Board either by correspondence or, if necessary, by a sitting of the Board convened for that purpose.

13. The General Assembly is to meet at least once every three years, being summoned by the President. This summons is to precede the date of meeting by at least three months and is to state the matter to be discussed at the sitting.

Questions of a scientific nature are to be decided by a majority obtained from the votes of all the delegates. In administrative questions or questions of a mixed kind voting is to take place by State (*i.e.* one vote to each State) if a member of the Permanent Board demands it (*i.e.* such a method of voting).

14. A third of the total number of States is to have the right of requesting the President to convene an extraordinary assembly, submitting at the same time the matter to be discussed by such an assembly.

15. For a decision to be valid at least half of the States included in the scheme must have voted.

With regard to questions not mentioned in the list of matter to be discussed on the President's summons, no decision can be taken unless approved by a number of States equal to at least half the total number of States included in the scheme.

16. Any States included in the scheme which have not sent a delegate may confer their right of voting upon one of the delegates actually present. At the same time no single person may dispose of more than three votes.

In the event of an equal number of votes being cast the President is to have the casting vote.

17. The Assembly is to be empowered to constitute special commissions for the purpose of examining certain questions. All delegates may be present at the sittings of these Commissions.

The President may invite strangers who are outside the Commission to be present at its sittings.

18. During the periods of time between two successive general assemblies the accomplishment and the management of administrative matters are to be confined to the Committee.

The Committee is to take the written advice of the Permanent Board in unforeseen administrative questions

19. The Permanent Board is to establish its own rules of procedure.

20. The correspondence addressed by the Commission to the States affected by the scheme is to be signed by the President and the General Secretary.

The Director of the Bureau International is to write direct to the delegates of the various States, to national centres which send out time signals or which are engaged in observations and calculations connected with those signals, to learned societies and to private persons who may request information about questions of a scientific nature.

21. The General Secretary is to give each General Assembly a statement on the situation of the Commissions. He is to publish the reports of the sittings of the Assemblies and the results of work carried out conformably to the decisions of the Commission. He is to be in charge of the correspondence and is to manage current matters which do not fall inside the duties of the Director of the Bureau International.

22. The Director of the Bureau International is to present a report every year to the President, which report is to cover the whole field of the activities of the Bureau. He is also to present him with a programme of work to be undertaken during the ensuing year. This Annual Report and the Programme of Work are to be printed and sent to all delegates of the States affected by the scheme.

23. The present agreement is to hold good for a period of eight years, beginning on January 1st, 1913. After that period it is to be obligatory for periods of four years unless a revocation is made giving at least six months' notice.

24. Any modification of the foregoing statutes is to be voted by a General Assembly under the regulations prescribed by Articles 13 to 16 inclusive.

C.—The following draft reply to the Foreign Office which had been previously submitted for approval by correspondence was agreed to.

SIR, 13th June, 1913.

I HAVE the honour to acknowledge your communication 17,634 transmitting a copy of papers with reference to the establishment of an International Commission, with its seat in Paris, for Time Signals to be transmitted by Wireless Telegraphy and business relating thereto, and with reference to the request of the Secretary of State for observations upon them I beg leave to reply as follows :—

I have submitted the documents to the Meteorological Committee, and in connexion therewith I have brought before the Committee a Report to the Admiralty, dated 20th January, 1913, drawn up by the Astronomer Royal, the Assistant Hydrographer, and Commander Silvertop, who were, with myself, the British representatives at the International Conference at Paris in October, 1912.

In the original outline of the programme of the Conference, the question of the collection and transmission of meteorological information was included. The subject was considered by one of the Sub-Committees appointed at the Conference, and it was resolved that—

" The foregoing questions are too complicated for immediate discussion. It is desirable that the " consideration of them should be entrusted, in the first instance, to a Commission composed principally " of Meteorologists and Directors of Radio-telegraphic stations. This Commission should present a " report at the next assembling of the ' Comité Météorologique International.' "

A meeting of the Comité Météorologique International was held in Rome, April 7th–12th, 1913, at which I was present as President, and no business concerning the Conférence Internationale de l'Heure came up for consideration by the Committee. It is therefore to be presumed that no action has been taken by the French Government with regard to the resolution referred to, and in the documents referring to the proposed institution, the subjects of Meteorology, Terrestrial Magnetism, and Seismology, with which this Office is more immediately concerned, are not expressly mentioned. The Meteorological Committee, therefore, can only express an opinion on the suggested " Projet de Convention International pour la creation à Paris d'une Commission Internationale de l'Heure," and the " Projet de Statuts," in so far as those documents refer to an international organisation for the transmission of Time Signals.

From this point of view the Committee agree with the opinion expressed by the British delegates in the following paragraph :—

> " It will be seen by paragraph 8 of the said Statutes that the proposal involves an annual " contribution of £80 by the British Government. The constitution of this ' Commission de " l'Heure ' with a bureau at Paris, will secure permanency, accuracy and uniformity of signals " transmitted from different wireless stations, which will be of undoubted benefit to navigators " and to exploring and surveying parties on land ; and the comparisons of time, as determined " at different observatories, will be of considerable scientific value and cannot fail to improve " the methods and precision of Time determinations. It is therefore submitted that it would " be desirable for the British Government to agree to participate in the scheme."

The Meteorological Committee have already arranged for the reception of the Time Signal at their Observatory at Eskdalemuir, and the short experience indicates that the proposed International Commission will be of practical service in many ways.

The Committee will watch for further developments with reference to the collection and distribution of meteorological reports by Wireless Telegraphy. Various questions arise in connexion with the code and language which should be used for the communications, as well as the time of observation, and other matters. At the present time this Office is the only centre in Europe for the collection of weather reports by radiotelegrahy from ships at sea, and there is no organisation for distributing them to other Meteorological Institutes. It is possible that it may prove desirable that the organisation for the collection and distribution of weather reports by radio-telegraphy, which must ultimately become international, should be organised independently of the Commission Internationale de l'Heure, but the Committee do not wish at this stage to express an opinion upon the point.

I am, &c.,
W. N. SHAW.

The Under-Secretary of State,
Foreign Office, London, S.W.

408. STATIONS. — **Ordnance Survey Department** (Minute 397). — Read — letter 1719 (2) from Colonel Close :—

Ordnance Survey Office,
Southampton,
2nd June, 1913.

DEAR DR. SHAW,

I HAVE to acknowledge the receipt of your official letter No. 1719 S. 3, of the 22nd May, 1913, on the subject of the supply and maintenance of meteorological instruments at the Ordnance Survey Offices of Southampton, Shrewsbury, and Dublin. Your letter indicates very clearly the necessary difference between our respective points of view. You, as Director of the Meteorological Office, naturally desire Public Departments to undertake meteorological observations free of charge to your Office. I, as Director of the Ordnance Survey, am responsible that the money voted by Parliament for the Survey of the United Kingdom is not spent on other objects.

Having regard, however, to the long series of years during which meteorological observations have been taken by the Ordnance Survey at Southampton and Dublin, it may perhaps be maintained that there is sufficient sanction for existing custom, and, without altogether accepting this proposition, I am prepared to allow the observations to be continued, at any rate for the present, if you are prepared to drop the suggestion that the Ordnance Survey should pay the Meteorological Office for the meteorological instruments in use at the Phœnix Park station in Dublin.

This is, I think, as far as this Department can go without referring the matter to the Treasury.

Yours very truly,
C. F. CLOSE.

It was agreed not to pursue the discussion of the question further at this time, but to continue for the time being to maintain the instruments for the Phœnix Park Station.

409. OFFICE STAFF.—**Appointment of Professional Assistants.**—Submitted—a list of 23 applications for four appointments as professional assistants, in accordance with a circular of 10th June notifying the vacancies.

It was agreed that the appointments be subject to increments of £15 per annum, on the recommendation of the Director, at the commencement of the financial year ; that the commencing salaries, unless otherwise ordered, be in accordance with the list given on D. 384 ; with a provision of £150, if necessary, for a professional assistant for the new scheme for Falmouth Observatory ; the appointment of graduate assistant for the Forecast Division at £60, provided in D. 384, being suspended for the time being.

After discussion, the Director was requested to make further inquiries and report for approval his recommendations for the appointments.

410. DIRECTOR'S REPORT AND ACCOUNTS :—

Ice Scout.—Reported—that a number of letters had been received from Mr. G. I. Taylor with reference to the progress of the meteorological and aerological work on board the "Scotia." (Minute 399).

Report of Work for May, 1913.—1. *Marine Division.*—Logbooks and Registers.—24 Meteorological Logs and one abbreviated Log ; also 121 North Atlantic Registers, 64 Radio-telegraphy Registers, and 22 Indian Ocean Registers, dealt with on receipt.

North Atlantic Meteorological Chart.—Issue for June, 1913, published ; and issue for July in course of preparation.

Indian Ocean Meteorological Chart.—Issue for July, 1913, published ; and issue for August in course of preparation.

Extraction of Observations relative to the Arctic Regions, Davis Straits, etc.,—15 Logs.

Reports of Ice.—30 sent to "Shipping Gazette."

Corrections for Barometers Obtained.—Radio-telegraphy forms, 27.

Decoding 60 Messages from "Scotia," and despatching them to Companies and Shipping Papers.

2. *Forecast Division.*—(1) Current work has been kept up to date.

(2) Number of wireless messages has been :—

(*a*) From H.M Ships, May, 0.

(*b*) From ships of Mercantile Marine, May, 426.

(3) Inquiries :—

	May.
Prepaid Replies	20
Other Telegraphic Inquiries	25
Wireless Inquiries	—
Telephone Inquiries	14
Personal Inquiries	1

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, 1912 and 1913.

Parts I. and II.—Weekly and Monthly Issues up to date.

Appendix I.—1st Quarter, 1913, issued.

Part III. Section 1.—Monthly Values prepared up to date.

Section 2.—August, 1912, issued. September, 1912, sent to printer.

Part IV. Section 1 :—

Kew, September, 1912, issued.

Valencia, October and November, 1912, issued.

Eskdalemuir, October, 1912, issued.

Section 2.—Aberdeen, Summaries completed up to July, 1912.

Falmouth, Summaries completed up to July, 1912.

The examination of the Observatory records and of Sunshine Cards, the tabulation of cup anemograms, and the summaries of pressure tube anemograms have been kept up to date.

Library :—

	May.
Authors' cards prepared for Catalogue	12
Cards prepared for Subject Catalogue	Nil
Total number of Publications received	524

Inquiries :—

Newspapers	10
Legal	25
Scientific and Commercial	96
Forecasts	2
General	0

	£	s.	d.
Receipts in connexion with Inquiries	6	19	3

Tables have been prepared for use in connexion with the tabulation in millibars of the photographic barograms from Eskdalemuir.

The returns from 74 rainfall stations have been summarised for April, 1913, preparatory to the publication of the monthly totals at the end of the year.

Weather notes prepared for issue to Agricultural Shows at Taunton, Barnstaple, Bicester and Truro.

4. *Instruments Division.*—Admiralty Work.—Supplies have been sent to Bombay, Malta, Cape Town and Sydney.

Marine Work.—Five ships have received supplies directly from the Office ; hydrometers have been sent to Cardiff.

Six sea temperature thermometers have been issued to light vessels and shore stations.

Stations.—A minimum thermometer has been sent to Skegness.

Observatories.—The instruments used for tabulating photo barographs at Valencia and Eskdale have been provided with millibar scales engraved opposite to the inch scales.

Home Requisitions.—Instruments have been supplied on repayment to nine private and municipal stations. Five frames for the display of storm warnings, &c., have been issued.

Colonial Requisitions.—Three consignments have gone to the Colonies.

Meteorograph Boxes.—Ten were sent to finders in England, seven to Ireland and five to Scotland.

Exhibition.—Models, diagrams and instruments have been sent to Ghent to be added to the office exhibit there.

Publications.—Report for May, 1913, from Clerk of Publications :—

	May.	
	Received.	Issued.
Daily Weather Report	855	835
Weekly Weather Report	375	320
Monthly Weather Report	575 (April)	465 (April)
Do. Do. (Maps)	25 „	2 „
Daily Readings	—	—
Geophysical Journal	150 (July) 150 (Title page and cover, 1911).	133 (July) 133 (Title Page and Cover, 1911).
Hourly Values—Meteorological.—Kew	300 (Aug. and Sept.)	11 (Aug.)
Eskdale	300 (Sept. and Oct.)	11 „
Valencia ...	300 (Oct.)	11 „
Do. —Geophysical	—	—
Monthly Meteorological Charts (Atlantic)	600 monthly (to June, 3)	577
(Indian)	350 (June and July)	357
International Upper Air Observations	—	—
Seventh Annual Report	—	2
Observer's Handbook (1911)	—	2
"Forecasting Weather"	—	—
Cloud Atlas	—	1
Report—Commission for Weather Telegraphy ...	—	4
Do. do. Maritime Meteorology ...	—	3
Summary of Signals	—	3
Calendar, 1913	—	—
Structure of the Atmosphere	—	—
Geophysical Memoirs, No. 1	—	1
No. 2	—	3
No. 3	—	1
No. 4	—	1

Receipts from sales at M.O.—May, 1913, £1.

M. O. Press.—During the month ended 31st May, 1913, the issue of the periodical publications has been as follows :—Daily Weather Report, maps for the Weekly Weather Report, maps for the Monthly Weather Report, Monthly Meteorological Charts of the North Atlantic, Monthly Meteorological Charts of the Indian Ocean, as contract.

On 1st May there were two requisitions for forms outstanding. Since that date one requisition has been issued and two discharged, leaving one requisition still on hand.

Fifty additional copies of the Daily Weather Report have been printed during the period in compliance with requests received from Educational Authorities.

Observatories.—Kew (*May, 1913.*)—The barograph, thermograph and anemograph (Robinson Cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the office.

The following absolute observations have been made :—

Magnetic	Declination	... 5
	Inclination	... 4
	Horizontal Force	4
Potential Gradient on 20 days.		
Wilson apparatus	„ 12	„
Pyrheliometer	„ 11	„

International cloud observations were made on 6 days.

Scale value determinations were made of the electrograph and seismograph.

In view of the approaching changes to the building, the Newman barometer, the photographic barograph and the clock Dent have been moved from the main building to the buildings outside. The time wire has been taken over to the old " Clinical House " and the time signals are now received there.

The calculations relating to the comparison of the Kew and Eskdalemuir standard magnetometers have been completed and the results have been submitted to the Director, and also to the Gassiot magnetic sub-committee at their meeting on 23rd May.

Mr. L. Richardson has been receiving a course of magnetic instruction since 19th May.

Photographic paper has been supplied to Eskdalemuir Observatory.

Mr. Francis has been absent one day on jury duty at Kingston, and Mr. Levin has been absent two days on medical certificate.

Accounts.—*Payment of salaries and banking account.*—A proposal to pay a single cheque for salaries each month to an account to be opened at the Brompton Branch of the London County and Westminster Bank, and to pay the separate salaries by cheques on this account, so as to enable the members of the staff to cash their own cheques instead of sending a messenger from each division to cash a number of cheques at Burlington Gardens, was approved ; and, subject to the approval of the Treasury representative, the Director was authorised to open an account on the London County and Westminster Bank on the terms set out in D. 06, and to pay over the sum of £200 to keep as a balance at the London County and Westminster Bank for the purpose of the account.

Expenses of travelling by motor-car.—An application from Mr. J. S. Dines to be allowed 2*d.* per mile for two journeys by motor-car from Pyrton Hill to Farnborough, was allowed.

Submitted—The following statement of the Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on 31st March, 1913	47	16	8
Receipts from 1st April—31st May	6,979	10	9
	7,027	7	5
Cheques drawn from 1st April—31st May	3,677	8	8
Balance on 31st May, 1913	£3,349	18	9

Upon the adjournment of the meeting the Committee inspected the new bookcase in Room 25, presented to the Office for the preservation of the series of Daily Weather Charts of the Globe. (Minute 344.)

FIFTIETH MEETING.

South Kensington, S.W., 16th July, 1913.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW. | THE HYDROGRAPHER.
CAPTAIN HARVEY. | CAPTAIN LYONS.

MR. MIDDLETON.

411. The Minutes (400–410) of the last Meeting (25th June, 1913) were read and confirmed.

412. ANNUAL REPORT.—The report to the Treasury for the year ended 31st March, 1913, was submitted and approved, subject to any verbal corrections which might be received before the signed copy is sent to the Treasury (Minute 403).

413. OFFICE STAFF.—**New Appointments.**—Upon the recommendation of the Director the following appointments were approved as from 1st July, 1913 :—

Assistant Magnetician at Kew Observatory.—C. D. Stewart. Age 24. B.Sc. London (1st Class Honours 1912) Derby Technical College. Now schoolmaster. Salary : £125 rising by £15 to £200.

Assistant Meteorologist in the Forecast Division.—A. H. R. Goldie. Age 25. M.A. St. Andrew's. Wrangler 1913, St. John's College, Cambridge. Salary : £150 rising by £15 to £200.

Assistant Meteorologist at the Branch Office at South Farnborough.—H. Billett. Age 23. B.Sc. London. Honours in Physics (second on list). Demonstrator at the Imperial College of Science and Technology. Salary ; £150 rising by £15 to £200.

Assistant Meteorologist at the Central Office, for the Meteorology of the Globe.—C. E. P. Brooks. Age 24. B.Sc. London. Honours in Geology. Clerk-Assistant in the Meteorological Office since 1909. Salary : £125 rising by £15 to £200.

Re-appointments.—*Central Office.*—In view of the termination on 30th September, 1913, of the appointments of the Superintendent of the Forecast Division, the Superintendent of the Statistics and Library Division and of the Secretary to the Director (Minute 258) the following memorandum D. 413 was submitted and approved :—

REVISION OF THE DUTIES OF THE DIVISIONS.

Division 1 should be relieved of the preparation of Schedules of data for the Admiralty which should go to the "*Section Mondiale.*'

The female staff should have duty assigned to them in connection with the secretarial staff and the "*Section Mondiale.*"

The Superintendent of the Marine Division has undertaken to prepare a report upon the Distribution of Ice for the Board of Trade and a sum not exceeding £100 has been assigned by the Board of Trade for the purpose of providing additional clerical assistance to enable the present typist to devote time to translation (Minute 414).

With this sum additional assistance (two boys) should be given to the Marine Division and, with the relief of the preparation of the Hydrographer's tables, this would make up to the Marine Division for the transfer of the female staff to the secretarial section.

Division 2, in conjunction with the branch office at South Farnborough, should take charge of dynamical meteorology, and therefore *manage* the stations at Falmouth, Yarmouth and Gorleston, Scilly, Gibraltar, and all stations which contribute observations to the first page of the Daily Weather Report, except the observatories. Provision should be made for the division to see without delay any records &c. which bear upon daily weather.

The observatories should keep a special barograph, thermograph and hygrograph for the Forecast Division, the records from which need not be preserved in perpetuity.

The arrangement of the forecasters' duties may be revised.

Division 3 should compile the Year-book and manage all home stations but those referred to under Division 2. The observatories should send their contributions ready to be printed—they should not be "checked" in the Office except by arrangement between the Superintendent of the Observatory and the Superintendent of the Division.

The Division should have a staff which is exchangeable with the Observatory staff and keep itself familiar with observatory processes.

The *Section Mondiale*, which is provisionally in the personal charge of the Director, is to deal with Colonial Stations, International Meteorology and the *réseau mondial* ; it will ultimately form a Library and Inquiries Section in conjunction with the Secretarial Staff.

Library and Inquiries and Issue of Publications should be associated with the *Section Mondiale* and ultimately form part of a secretarial division—the Year-book with its incidental questions and researches would remain the work of Division 3.

The custody of documents and records should belong to the Library.

Division 4 should meet any requisitions with regard to equipment from Divisions 1, 2, 3, the observatories or stations, and carry out experimental and observational work that is not intended to be incorporated in the Daily Weather Report or the Year-book.

The Secretarial Staff should deal with ordinary correspondence and accounts, Colonial Meteorology, International Meteorology, and the *réseau mondial*, distribution and exchange of publications, the library and inquiries, translations, diagrams, &c.

Stationery Office Demands.—Demands on the S.O. go through the Director. When a M.S. is ready for the printer it is to be sent to the Secretary's Office to see that it is in accordance with the demand and minutes. The proofs are to be distributed therefrom one marked as printer's copy for correction.

Exception from this practice is allowed only in the case of regular issues of the Daily, Weekly, and Monthly Reports ; Appendices, &c. should follow the usual course.

Subject to the alteration of duties in accordance with the foregoing memorandum the following re-appointments were made for three years from 1st October, 1913 :—

Mr. R. G. K. Lempfert, Superintendent of the Forecast Division with a special addition of £25 a year to the current salary and to the maximum salary defined by regulation (Minute 240).

Mr. E. Gold, Superintendent of the Statistics Division with a special addition of £50 a year to the current salary and to the maximum salary defined by regulation (Minute 258).

Mr. R. Corless, Secretary to the Director and Clerk of Publications with a salary of £350 a year.

It was agreed that the Director's Secretary should in future be in attendance at meetings of the Committee.

In view of Miss Anderson's prolonged absences and feeble health it was resolved that it be suggested to her that her appointment should terminate on 31st December next.

Eskdale Observatory.—It was agreed that Mr. L. H. G. Dines be re-appointed professional assistant in seismology (Minutes 363, 372) for one year from 1st October, 1913 (with a salary of £213 on the understanding that 5*s.* a week is payable for quarters in the assistant's house).

British Association: Meeting in Australia.—Read—letter 3,707 from Mr. Gold, who has acted as Secretary of Section A of the Association since the Dublin meeting of 1908, inquiring whether special leave of absence would be granted to him in order that he might attend the Australian meeting in 1914, and whether a grant would be made towards the expenses of the journey in view of the importance as regards meteorological work of keeping in personal touch with the meteorologists of Australia.

It was agreed to reply that an endeavour would be made to grant the necessary special leave and that as regards a grant no action could be taken until the results of the current financial year are known.

414. Report on Ice for the Board of Trade.—Reported—the receipt of the following letter (3,096) and the acceptance of the undertaking therein set out :—

Board of Trade,
7, Whitehall Gardens, London, S.W.,
30th June, 1913.

Sir,

With reference to your letter of the 13th May forwarding a memorandum by Captain M. W. Campbell Hepworth, C.B., respecting the collation of existing information on the subject of ice, I am directed by the Board of Trade to inform you that they approve of the proposal set forth in the memorandum, and have obtained the sanction of the Treasury to the expenditure of a sum not exceeding £100 to provide a substitute for the typist to be employed on translation work. The Treasury state that the cost of books, &c. should be borne on the Stationery Office Vote in the ordinary course.

The Board would be glad if you would be so good as to ask Captain Hepworth to proceed with the work forthwith.

I am, &c.,
Geo. S. Fry.

The Director,
Meteorological Office,
South Kensington, S.W.

Approved.

415. FORECASTS.—Read—letter 3,262 from Mr. Herbert L. May, of Upton, Macclesfield, suggesting an arrangement for the distribution of forecasts by rural postmen.

It was agreed to make further inquiry as to local details before approaching the Post Office on the subject.

416. BRITISH ANTARTIC EXPEDITION, 1910.—The Director was authorised to make any arrangement approved by himself and Captain Lyons for the work of reducing and discussing the magnetic observations of the British Antarctic Expedition on the understanding that provision is made out of the publication funds for additional staff to make up for the time of the Superintendent and staff employed in the reduction.

417. OBSERVATORIES.—**Kew.**—The following scale of fees for testing magnetic instruments was approved :—

METEOROLOGICAL OFFICE.

TESTS OF MAGNETIC INSTRUMENTS.

Magnetographs, declinometers, magnetometers, dip circles, and separate magnets are tested at Kew Observatory.

As the accommodation for magnetographs is limited, anyone desirous of having a set tested should write some time in advance and arrange particulars.

Instruments should be consigned by hand, or, adequately packed, by rail or carrier, to the Superintendent, Kew Observatory, Richmond, Surrey.

In the case of magnetometers it is usual to determine the scale values of the magnets, their induction and temperature co-efficients and their moments of inertia, and to see generally that the instruments are complete and suitable for the purpose they are intended for. Measurements of the inertia and deflexion bars and verification of any attached thermometers are made by arrangement at the National Physical Laboratory (*see* below). Tables of corrections are calculated from the values found for the constants, and one or two absolute observations of Declination and Horizontal Force are taken as a check.

In the case of dip circles (inclinometers) complete observations—usually three in number—are taken with each dip needle. The difference between the results thus obtained and those derived from the Observatory standards are given for information. If the differences are unusually large, or the working of the needles or dip circle appears unsatisfactory rejection ensues.

Separate collimator magnets and dip needles are tested provided this can be done in the instruments belonging to the Observatory.

	£	s.	d.
Fees.—Magnetograph	*According to pattern.*		
Declinometer	"	"	
Unifilar Magnetometer with one collimator magnet	7	10	0
Separate collimator magnet with inertia bar	3	15	0
Separate collimator magnet without inertia bar, if moment of inertia determined	3	5	0
If no determination of moment of inertia	2	5	0
Dip Circle (Inclinometer) with one pair of needles...	1	1	0
Each additional, or separate, needle	0	10	6
Constant for total force observations. Determination	1	1	0
Total force weights. Set, when individually weighed	0	10	6
Gymbals and fittings tested for magnetism	1	1	0

When instruments have been submitted for examination and rejected a charge will be made according to the time occupied, but in any case not less than half the fee will be charged.

16th July, 1913.

THE NATIONAL PHYSICAL LABORATORY.

Tests on Magnetometer Inertia and Deflexion Bars and Magnetometer Thermometers.

5th June, 1913.

For the future these tests will be made at Teddington for the Meteorological Office.

Dr. Chree will furnish a simplified list of the tests on deflexion bars.*

The fees for these tests will be paid by the M.O., being 30*s.* for the complete tests divided as follows :—

	£	s.	d.
Deflexion Bar	1	0	0
Inertia Bar	0	7	6
Two thermometers tested at five points from –5°C. to 35°C. at 1*s.* 3*d.* each	0	2	6
	1	10	0

If additional thermometers covering a larger range are tested the fee may, at the discretion of the director, be increased.

These fees are to cover insurance and packing. Cost of transport to or from Teddington will be borne by the Meteorological Office.

R. T. GLAZEBROOK,
Director.

* *Note by Dr. Chree.* 19th June, 1913.
The information respecting the deflexion bar which we do *not* require consists of :—
The mean depth, the mean width, the cross-section.
Also we want the weight of the deflexion bar only to the nearest gramme, and its length only to the nearest millimetre.

THE NATIONAL PHYSICAL LABORATORY.

Testing of Compasses, Compass Cards, &c.

For the present this will be carried out at Kew by the Meteorological Office for the Laboratory at the following fees :—

	Full fee.	Half fee.
	s. *d.*	*s.* *d.*
Ships Compasses, Standards, with Bowl and one card... ...	4 6	2 3
Separate Cards	3 0	1 6
Ships Compasses, Steering...	3 0	1 6
„ „ Liquid	2 3	1 0
Prismatic Compasses—		
Class A	3 9	1 9
„ B	2 9	1 3
Pocket Compasses	1 0	0 6

Cost of transport to and from Kew will be borne by the Laboratory. The Laboratory charge to the senders will of course be in accordance with the scale of fees given in the Tests Pamphlet.

R. T. Glazebrook, *Director*,
4th June, 1913. The National Physical Laboratory.

418. Committee for the Meteorological Office, Edinburgh.—Submitted—the following :—

Minutes of First Meeting held in the rooms of the Scottish Meteorological Society, 122, George Street, Edinburgh, on Thursday, June 19th, 1913, at 3 p.m.

All the members of the Committee were present, viz.:—

Dr. W. N. Shaw, Director of the Meteorological Office, *Chairman* ;
Mr. R. B. Greig, representing the Board of Agriculture for Scotland ;
Mr. J. Patten Macdougall, C.B., Registrar-General for Scotland, representing his own Department ;

and, representing the Scottish Meteorological Society :—

Mr. J. Mackay Bernard, President,
Professor Sampson, and
Mr. E. M. Wedderburn.

The Chairman briefly recalled the origin of the Committee, which had arisen out of an application by the Scottish Meteorological Society for an increased grant from Government. The constitution and work of the Committee were defined in an agreement which was approved by the Scottish Meteorological Society on 23rd April, 1913, and by the Meteorological Committee on 30th April, 1913. On 8th May, 1913, the Meteorological Committee had informed the Treasury that they proposed to appropriate out of the present year's grant to the Committee a sum of £350 towards the expenses of a Meteorological Office to be formed in Edinburgh, and they had received on 4th June from the Treasury an acknowledgment of this letter. The first quarterly payment under the scheme of the grant of £350 for the year 1913–14, had accordingly been made to the Society on June 2nd, and further payments would be made on July 31st, October 31st, and January 31st.

The agreement placed at the disposal of the Edinburgh Committee a further sum of £100 paid direct to the Society in consideration of Reports prepared for the Registrar-General for Scotland.

The Chairman intimated that the Council of the Scottish Meteorological Society had appointed Mr. A. Watt, Secretary of the Society, to be Superintendent of the Office.

It was resolved that Mr. Watt be requested to act as Secretary to the Committee. Mr. Watt, who was present, accepted the appointment.

Dr. Shaw reported that he had been informed unofficially that the Fishery Board for Scotland would be glad to be represented on the Committee, and Mr. Bernard undertook to find out the views and wishes of the Society, and if the Society approved, of the Fishery Board, in this matter.

The Committee then proceeded to consider the administration of the grants of £450 for the year 1913–14.

The Chairman read over various regulations of the agreement defining the work of the Committee. The Committee took note that for the financial year commencing 1st July, 1913, out of the total grant of £450 allocation at the rate of £366 was required on account of the salaries of Superintendent and Staff as from July 1st, 1913.

Some conversation took place as to the form in which the expenditure should be accounted for under Regulation 4, and the consideration of the question was deferred.

Mr. Watt submitted the following memorandum on the various departments of the work of the Office :—

Monthly and Quarterly Reports to Registrar-General for Scotland :—The Monthly Report is based on returns from eight of the large towns of Scotland, and is lodged as a rule on 5th of each month. The discussion is as a rule based chiefly on the statistics of the eight towns, but occasionally a rather wider outlook is taken if there have been events of exceptional interest, and if it has been possible to work up other returns.

The Quarterly Report consists of three Monthly Reports, and is lodged about the 20th of January, April, July, and October. At present statistics are given for about 75 stations. The figures for the Telegraphic Stations of the Meteorological Office (Wick, Nairn, etc.) and for one or two other stations are extracted from the Monthly Report of the Meteorological Office, the figures for the third month of each quarter being sent in manuscript from London.

Much additional information is considered and analysed before the descriptive sections of the Report are written—such as rainfall returns from other stations, weather records kept at the Northern Lighthouses, and newspaper cuttings.

Supply of Returns to the Meteorological Office, London:—Sixteen monthly summaries are forwarded to London about the 12th of each month, and daily values for one or more stations. These returns are incorporated in the Monthly Weather Report of the Meteorological Office.

Rainfall Observations:—For the past few years increasing attention has been paid to rainfall work, and monthly rainfall values for some 600 stations are published in the Journal. The amount of work involved is very great and much correspondence is necessary. Before publication all returns are compared with the similar returns received by Dr. Mill of the British Rainfall Organisation. This side of the work should be developed in every possible way.

Inquiries:—These are of a varied character. Occasionally information is required for some legal purpose, and there are numerous inquiries which can be answered in a short letter. Inquiries from teachers are frequent, and much gratuitous help has been given to workers of that class.

Inspections:—About three or four weeks of the Secretary's time have been taken up each year with inspection work, and in addition he has paid a visit of eight days or so to the Meteorological Office each spring and autumn.

Mr. Greig urged the importance of systematic phenological observations, and Mr. Watt was instructed to consult with Mr. Greig as to the possibility of organising a system of observations. Mr. Greig also suggested that reliable meteorological observations might be secured from some of those interested in the extensive fruit-growing industry in Scotland, and Mr. Watt was instructed to write to Mr. J. H. Hodge, Blairgowrie, who was known to be already making observations.

The next meeting of the Committee was fixed provisionally for 20th October, 1913.

FIFTY-FIRST MEETING.

South Kensington, S.W., 22nd October, **1913.**

PRESENT:

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	CAPTAIN LYONS.
THE HYDROGRAPHER.	MR. MIDDLETON.

419. The Minutes (411–418) of the last meeting (16th July, 1913), were read and confirmed.

420. CORRESPONDENCE.—**Absence of Director.**—Reported—that at the request of the Chairman, Captain H. G. Lyons had acted as deputy in the absence of the Director from 6th August to 6th September, and that the Treasury had instructed the Bank of England, Western Branch, to accept the signature of Captain Lyons, on cheques drawn on the Committee's account, in lieu of that of the Director during that period.

Approved.

Banking Account (Minute 410).—After further consideration it was agreed that a draft letter to the Treasury asking for the banking account of the Committee to be transferred from the Western Branch of the Bank of England to the Brompton Branch of the London County and Westminster Bank, should be prepared for the next meeting.

Forecasts.—Read—letter (4,690) from Mr. E. Mawley, of Berkhamsted, recording his opinion as to the great improvement in recent years of the forecasts issued by the Office.

421. OFFICE STAFF.—**Scott Antarctic Fund.**—Read—letter 4,791 from Captain Lyons, Honorary Editor for the Publication of Scientific Results of the Fund:—

CAPTAIN SCOTT ANTARCTIC FUND. PUBLICATION OF SCIENTIFIC RESULTS.

M.O. 4,791.

5, Heathview Gardens,
Roehampton, London, S.W.,
18th October, 1913.

SIR,

I AM desired by the Publication Committee of the Captain Scott Antarctic Fund to say that Dr. C. Chree, F.R.S., of Kew Observatory, has agreed to undertake the discussion of the Magnetic Observations of the Captain Scott Expedition. The Committee understand that it would be convenient if Dr. Chree could devote a portion of his working time to this investigation. They therefore propose to contribute to the Meteorological Office a sum equal to the corresponding portion of Dr. Chree's salary if this arrangement meets with the approval of the Meteorological Committee.

It is suggested that the proportion should be one-fourth for the present. They would also meet all charges for such computing assistance, stationery, &c. that may be needed. At the same time they hope that the Meteorological Committee may be able to allow such computing to be done in Kew Observatory if that should prove to be the most suitable arrangement.

Yours faithfully,
H. G. LYONS,
Hon. Editor.

Dr. W. N. Shaw, F.R.S.,
Director,
Meteorological Office.

It was agreed that one-quarter of Dr. Chree's time, estimated at £164 in the year, should be allowed for the work ; that computers or computers' time should be provided by the fund or paid for as overtime at Office rates ; that the work should be carried out at Kew Observatory without charge for accommodation or for ordinary writing materials ; that materials, drawing instruments, &c. which have to be obtained specially for the work should be charged against the fund and belong thereto ; and that a supply of Stationery Office forms should be made from the Office stock as may be required for use in computation and tabulation, and paid for at the rates prescribed by the Stationery Office.

New Appointments and Promotions.—Reported—Order 270 appointing Mr. E. H. Nichols professional assistant at Kew Observatory for one year as from 7th October, 1913, at a salary of £125. The salary is provided from the money to be paid by the Scott Antarctic Fund.

Also—Order 263 recommending Mr. R. Pyser, boy clerk, for appointment as Staff Clerk, fourth class, from 1st October, 1913.

Reported further—Order 267 appointing Miss Helena Margherita Powell, B.Sc., as professional assistant to date from 13th October, 1913, at a salary of £12 10*s.* per month. The special duties attached to the appointment are to assist in the preparation and editing of publications for the Office. The appointment terminates on 31st July, 1914, in the absence of further order.

Also—Order 271, appointing Miss Dorothy Chambers as shorthand typist, in succession to Miss A. Turney, resigned, at a salary of £75 a year of which £10 is to be regarded as deferred pay. The appointment dates from 20th October.

Also—Order 272 reappointing Mr. H. W. Braby graduate assistant at a salary of £80 a year as from 1st October, 1913. Mr. Braby had been absent under medical advice from 30th January, 1913, to 17th September, 1913, and his pay at the rate of £60 a year had been suspended from 1st April to 17th September.

Also—Order 268 appointing Messrs. E. Boxall and B. Francis assistants at Kew Observatory with staff-clerkships of the second class, to date from 1st October, 1913, under the regulations of Circular 002 and the revised regulations for Kew Observatory printed below.

Reported also—Orders 245A, 263, and 273 transferring Mr. A. E. Gendle from Eskdale Observatory to the office as clerk in Class III with a special salary of £163 a year in consideration of his salary at the Observatory having included rooms rent free, and transferring Mr. P. N. Skelton to Eskdale Observatory as from 1st October, 1913, with a special increase of salary of £15 a year.

Also—that the appointments of boy clerks under Civil Service terms, reported in Minute 394, had been terminated on 30th September, and, that, after an examination held in the Office on 29th September, appointments had been made and dated as follows :—

1st October, Joseph Leslie Gray, born 18th October, 1895 ;

4th October, Harry James Dormer, born 1st January, 1895 ;

13th October, Walter Rawson Berry, born 20th June, 1897 ;

13th October, Cyril Victor Ockenden, born 12th July, 1897 ; to be probationers for service in the Office.

13th October, Edward Lister Clinch, born 17th October, 1896, to be boy clerk, for service in the Office.

7th October, L. G. Hemens (*see* Minute 394) to be probationer for service at Kew Observatory. (Orders 265, 271.)

The appointments are made under the terms of Circular 002.

Also—Order 246 appointing John Beck, aged 14, boy clerk at Eskdalemuir, to date from 5th May, 1913, on the usual terms beginning at 12*s.* 6*d.* a week.

Also—the appointment, as boy-messenger, of J. Alder, born 30th September, 1899, in place of H. Colbon, discharged. Wages, 7*s.* 6*d.* a week, rising to 10*s.* after six months approved service. (Order 264.)

Also—the appointment as office boy of A. C. Taylor, born 6th May, 1899, at 7*s.* 6*d.* a week, rising to 10*s.* after six months' approved service. (Order 247.)

The appointments were approved and it was agreed to revise the establishment of clerks on the Office staff as set out in Circular 002 in order to provide for the clerkships of the various grades on the joint staff of the Office and Observatories.

Schuster Reader.—Reported—that Mr. G. I. Taylor, Schuster reader, had resumed his duties on 14th September on being released by the Board of Trade from service in connexion with the "Scotia," which dated from 24th February, 1913.

Superannuation.—Read—letter 4,368 from Miss Anderson. It was agreed that Miss Anderson's appointment should terminate on 31st December, 1913 (*see* Minute 413).

The Director was authorised to include for consideration in the estimates provision for substituting an annual payment of £35 in lieu of the accumulation in the Post Office and the special contribution of £200 under Minute 179, and to inform Miss Anderson of that proposal.

Kew Observatory.—The following revised regulations for the working of Kew Observatory (*see* Minute 385) were approved :—

KEW OBSERVATORY.

General Regulations.

On and after 1st October, 1913, the provision for the work of Kew Observatory will be as follows :—

The ordinary salaries will provide for all the ordinary work of the Observatory, with the exception of Sundays, Christmas Day, and Good Friday. Overtime will be paid for the necessary hours of attendance on these days at double rates : and, by special arrangement, for work undertaken by the Observatory on repayment, at "time and a half" ; but no overtime payments will be made for holidays.

The ordinary salaries will provide for eight hours' attendance per day, with one half-day holiday per week, to be taken by the several members of the staff as arranged by the Superintendent. Those members of the staff who can be spared will take the half-holiday on Saturdays and the public holidays on the fixed days ; the others will have days allowed at other times. The other holidays are as set out in the Meteorological Office Circular 002.

The hours of attendance of the several members of the staff will be arranged by the Superintendent to meet the needs of the work of the Observatory. The ordinary work of the Observatory includes the observations at 7 a.m , 6 p.m., and 9 p.m., and the necessary telephonic reports to the Meteorological Office ; attendance on the magnetographs, meteorological, electrical, and seismological instruments, and any other observations appropriate to a physical observatory ; together with the tabulation, preparation for publication, and discussion of the results.

A dinner hour is allowed at times approved by the Superintendent, and time off for breakfast may be given to the member of the staff on duty for the 7 a.m. observations.

The staff of the observatory, subject to these rules will be :—

A resident observer.
2 assistants.
2 probationers.

It will be the duty of the resident observer to keep the weather book for the hours outside the usual hours of attendance at the Observatory.

Until further order—

the resident observer will be graded as Professional Assistant on the Meteorological Office staff, and eligible for promotion as Meteorologist, Magnetician, or Seismologist ;

the assistants will be graded in the second class of clerkships on the Meteorological Office staff.

The resident observer and assistants may be required to take temporary duty at any of the establishments of the Meteorological Office, without additional payment. While employed on this duty they will be provided with lodging or an allowance in lieu thereof, and out-of-pocket travelling expenses will be allowed.

These rules will come into regular operation on the completion of the alterations at the Observatory by the Office of Works, and, in the meantime, the Superintendent will make such temporary arrangements as may be necessary for carrying on the work.

The tabulation of the curves is to be kept "up to date" as prescribed from time to time in the Calendar with Notes and Diary of Operations for the use of Observers. For the magnetic curves, until the selection of curves to be tabulated and the scale values and base values can be determined at the time, "up to date" is to be interpreted to mean—

(1) as regards the provisional tabulation for the Geophysical Journal, within one week of taking off the curves ;

(2) as regards the final tabulation, one year later.

30th September, 1913.

KEW OBSERVATORY.

Notice for the guidance of the Staff.

From October 1st, 1913, the whole of the regular work of the Observatory will be distributed between the members of the staff, and the salaries as then arranged will be held to include provision for the efficient work of the Observatory, including any attendances necessary outside the usual office hours.

The usual work outside office hours consists of:—

(1) The weather log, *i.e.*, a general watch of the weather and the noting, sketching, and, if possible, the photography of any exceptional atmospheric, celestial or terrestrial phenomenon that may have a bearing upon meteorology, terrestrial magnetism or seismology.
(2) The observation at 7 a.m. for the Daily Weather Report.
(3) The observation at 9 p.m.
(4) The Sunday observations for the Daily Weather Report, together with attendance on the magnetic instruments on Sundays.

But any other work which, on occasions though unforeseen, proves to be desirable for the efficiency of the Observatory, must be taken up without special orders being given. The ordinary salaries are intended to cover any such emergencies.

Hours of Attendance.—Eight hours a day (inclusive of a dinner hour) will be counted as ordinary attendance, and may be either

7 a.m. to 3 p.m. (early attendance),
9 a.m. to 5 p.m. (ordinary attendance),
10.15 a.m. to the transmission of the evening message,

as may be ordered. The members of the staff will, when necessary, take duty in turn. Saturday afternoon from 1 p.m. will be a holiday unless there is urgent observational work which requires continued attendance.

An attendance book and leave book will be kept.

A room will be provided in the Observatory for a resident observer who will, as far as is practicable, keep the "weather log" for the hours between 6.15 p.m. and 7 a.m.

After the 9 p.m. observation he may go to bed, but he will be expected to get up and do what can be done in the way of observation on the occasion of thunderstorms, or other disturbing occurrences, and also in case of halo, aurora, which he may notice.

The ordinary staff of the Observatory will be :—

One professional assistant (graduate), £125 to £200.
Two clerical and technical assistants, £175 to £200, graded as clerks of the Second Class of the Meteorological Office Staff.
One clerical and technical assistant, £125 to £150.
Two boy-clerks or supernumerary clerks.
Caretaker who can act from time to time, if necessary, as deputy observer for the 9 p.m. and 7 a.m. observations.

The members of the staff may at any time be employed temporarily or permanently at the Office or at one of the other Observatories at the same salaries.

In the case of employment at the Office travelling expenses cannot be allowed, but in the case of temporary employment at one of the other Observatories an allowance will be made for travelling expenses there and back.

30th September, 1913.

422. NEW OFFICE.—**Post Office Charges** (Minute 353).—Reported—the following correspondence :—

From H.M. Treasury to Meteorological Office in reply to letter printed in Minute 353.

14,285/12 (M.O. 1969).

Treasury Chambers,
2nd May, 1913.

SIR,

WITH reference to your letter of the 11th July last (1,501/T.C. 01), relative to the delivery of Meteorological Telegrams, I am directed by the Lords Commissioners of His Majesty's Treasury to request you to inform the Meteorological Committee that They have given Their careful consideration to the questions raised therein, and have been in communication with the Postmaster General, copy of whose Report dated the 13th February last is enclosed.

I am now directed to state that My Lords are willing to authorise the transmission free of charge of "service messages" from the Meteorological Office to the Central Telegraph Office.

As regards the question of payment for the transmission from the Central Telegraph Office to the Meteorological Office of certain foreign weather reports, in respect of which a sum estimated at £400 is claimed by the Postmaster General, Their Lordships feel that there is much force in the considerations mentioned by the Post Office: but, as the whole case is of an exceptional character and can hardly constitute a precedent, They think that it may reasonably be settled by a compromise and They suggest that an annual sum of £100 should be paid to the Post Office by your Committee as a commuted rate.

I am, &c.,
T. L. HEATH.

The Director,
Meteorological Office.

THE SECRETARY, TREASURY.

BEFORE 1879 a diversity of practice existed with regard to the method of charging for telegrams sent to and from the Meteorological Office and Continental Observatories. Some of the telegrams were charged for at the full rates, some at half rates, and others were allowed free transmission.

The concession of free transmission to meteorological telegrams was optional on the part of the signatories of the Telegraph Convention ; and the British Post Office and the Submarine and German Union Telegraph Companies did not regard such telegrams sent to and from the Continent as telegrams to which free transmission could be afforded. Continental Telegraph Administrations, as also the Great Northern Telegraph Company, on the other hand, passed Meteorological telegrams free over their lines ; but, notwithstanding this, the Meteorological Office had, in the case of some of the telegrams, been charged by the British Post Office with the full rate to their place of destination.

In 1879 the system of charging was revised by this Office ; and under this revision (carried out in 1880) the sums due for Meteorological telegrams sent from this country to the Continent were charged to the Meteorological Office.

The Meteorological Office had already (in a letter to the Post Office dated 18th November, 1879) accepted liability to pay for transmission of all messages from the Continent over English land lines ; but, as the Meteorological Office rented a private wire from the Central Telegraph Office to their premises at Westminster, in accordance with the ordinary practice under which telegrams are transmitted over a private wire free of charge, no charge was made to the Meteorological Office, under the revision, for inland transmission of the telegrams.

The Meteorological Office was transferred from Victoria Street, Westminster, to South Kensington in October, 1910, the new Office being situated in the same building as the South Kensington Branch Office with which it is connected by pneumatic tube, provided free by the Post Office.

The private wire was surrendered on the removal of the Meteorological Office to South Kensington ; the telegrams hitherto sent over the private wire, including those from abroad for which payment estimated at £400 a year is now being suggested by the Post Office, are now sent to and from that Office and the South Kensington Branch Office by the pneumatic tube, and to and from the Branch Office and Central Telegraph Office over the public wires, and the Post Office, in suggesting payment, is merely carrying out the principle admitted by the Meteorological Office in their letter of November, 1879.

The United Kingdom has never made arrangements with other countries for free transmission to be accorded to Meteorological telegrams. In the case of certain telegrams such as those exchanged with Germany, the full ordinary charge is made and passed through the accounts. In other cases—for instance, France—the Post Office charges the Meteorological Office with its proportion on outward telegrams and allows nothing to the French Administration for transmission in France. In the reverse direction the French Administration allows nothing to the British Post Office for the transmission in this country, and, it is believed, grants free transmission in France as well.

Strictly speaking so long as the Post Office does not grant free transmission to Meteorological telegrams it would be justified in notifying the French Administration that payment will be required of the British proportion on inward telegrams and similarly as regards Scandinavian, Spanish, and Portuguese telegrams ; and if this course were adopted the revenue due to the British Post Office would be approximately £500 a year instead of the £400 now claimed. The Foreign Administrations concerned would then probably demand payment of their proportions of the charges on outward Meteorological telegrams ; and the position of the Meteorological Office, financially, would be worse than if it paid the £400 a year now proposed.

On the removal of the Meteorological Office to South Kensington additional attendance outside the usual hours of telegraph business, required by that Office, was provided at the South Kensington Branch Post Office at an annual charge. The Meteorological Office complained of the charge ; and the Post Office suggested, as an alternative to the Special Attendance, that a private wire be again rented (at a cost less than that of a Special Attendance). The Meteorological Office objected on the ground that they would be required to provide a manipulative staff ; and at the same time they asked that informal communication with the Central Telegraph Office be made through the staff at the Branch Post Office by telephone for an agreed sum instead of by "service" telegram, paid for at the ordinary inland rate.

Two telephone circuits, over which *all* Meteorological telegrams sent from South Kensington and the Central Telegraph Office could be carried, were then offered in lieu of the proposed wire in the letter of the 30th of April last ; and at the same time the circumstances in which payment would now be required for Weather Reports from abroad were explained.

A reply to this letter has not yet been received.

With regard to the request of the Meteorological Office for the exclusive use of two wires between the Central Telegraph Office and the South Kensington Branch Office daily from 7.15 a.m. to 9.30 a.m., from 1 p.m. to 2.15 p.m. (except Sundays), and from 6 p.m. to 7.15 p.m., it should be explained that three direct public wires are now in use between the Central Telegraph Office and the Branch Office during the morning and evening hours mentioned, and that, although little Meteorological work appears to come to hand between 1 p.m. and 2.15 p.m. (week days), the three wires are then available. The Meteorological telegrams receive priority ; their prompt transmission is not therefore interfered with by other telerams sent over the same circuits, and, if the Meteorological traffic during the hours mentioned were confined to two circuits only delay would result, and the facilities afforded the Meteorological Office would be less than under the existing arrangements.

Since the private wire was given up the Meteorological Office have been required to pay for service messages, that is messages of enquiry of the Central Telegraph Office regarding Meteorological traffic ; and, as they do not wish to rent a private wire or a private telephone circuit, I am unable to suggest any alternative arrangement by which direct communication can be made with the Central Telegraph Office for the purpose of enquiry. Their Lordships may, however, perhaps be willing to authorise the transmission of the service messages free of charge.

A. M. OGILVIE.
13th February, 1913.

From Meteorological Office to H.M. Treasury.

1,969/T.C. 01.

SIR, 24th May, 1913.

WITH further reference to my letter of 11th July, 1912, and 5th May, 1913, I ask leave to revert to the question of the compromise with the Post Office with a view to getting telegrams from Vardö included therein, under the following special circumstances.

I delayed writing to the Post Office an official answer to their letter of 30th April, 1912, until I could look into the details of some questions raised in the Post Office memorandum. In the meantime the Hull Steam Trawlers Mutual Insurance and Protecting Company wrote to say that for insurance purposes they wanted information from some point further north than Bodö. We require the information from the far north also for the daily weather service. I thereupon wrote to the director of the Norwegian Meteorological Service, and asked if he could supply reports from Vardö, Varanger Fjord, with the rest of the Norwegian messages, which I supposed were sent gratis as heretofore, by the courtesy of the Great Northern Telegraph Company. He has answered that "the morning telegram from Vardö can be sent gratis to your office if it will be transmitted by the English lines without payment from the Norwegian authorities. The Great Northern Telegraph Company is not longer interested in the cables through which these telegrams are transmitted."

I do not know what payments the English lines could claim in respect of this addition to the morning message from Norway, but clearly it would not be equitable to make a charge against the Norwegian authorities, and I suggest that the message from Vardö may be included with the present morning message and be covered by the compromise.

I am writing to the Post Office to this effect, and informing them that I am addressing this letter for the consideration of Their Lordships.

A copy of the correspondence referred to is enclosed.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W.

From H.M. Treasury to Meteorological Office.

15,771/13 (M.O. 4,067). Treasury Chambers,

SIR, 1st September, 1913.

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your Report of the 24th May last (1969 T.C. 01), relative to a proposed daily service of telegrams from Vardö.

In reply I am to state that by a letter of even date to the Postmaster-General, of which a copy is enclosed, my Lords have authorised the transmission of these telegrams by the Post Office without charge.

I am, &c.,
T. L. HEATH.

The Director, Meteorological Office.

15,771/13. Treasury Chambers,

SIR, 1st September, 1913.

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your Report of the 28th July last (108,219/13), further respecting the transmission to the Meteorological Office free of charge of certain foreign telegrams containing weather reports.

In reply I am to say that it was Their Lordships' intention that the commuted payment of £100 a year, which was suggested in Their letter of the 2nd May last (14,285/13) should cover all services in respect of such telegrams at present rendered without charge by your department.

As regards additions to the present service of weather reports from abroad including the proposed series of telegrams from Vardö, which formed the subject of the reference from this department of the 5th June last (11,145/13), it appears to their Lordships to be unnecessary that an actual cash payment should be made to your department in respect of incoming telegrams which the government of the originating country agrees to treat as a free service. They think that it will be sufficient if the excess cost of the services rendered to the Meteorological Office over the payments made by that office is included in the annual statement of services rendered by the Post Office to other departments.

My Lords would, however, be glad to have their attention drawn to any large extension of the existing service.

I am, &c.,
T. L. HEATH.

The Postmaster-General.

From Post Office to Meteorological Office.

118,635/13 (M.O. 4,827).

General Post Office, London,

SIR, 21st October, 1913.

WITH reference to your letter of the 24th of May last, No. 1,969, T.C. 01, I am directed by the Postmaster General to state that, with the authority of the Treasury, the value of Telegraph services rendered by the British Post Office over and above the amount actually paid by the Meteorological Office will be recorded, as free services, against "Scientific Investigations, &c."

Payment at the commuted rate of £100 a year is due from the 29th of October, 1910, the date on which the telegrams were first sent over the public wires from the Central Telegraph Office; and the total charge at that rate from the 29th of October, 1910, to the 30th of June, 1913, namely, £267 7*s.* 10*d.*, will be included in the account for June, 1913, which is about to be rendered to the Meteorological Office.

You will perhaps be good enough to state when the Vardö service, which will be included in the arrangement, will begin.

I am, &c.,
A. F. KING.

The Director, Meteorological Office.

It was agreed that the following reply should be sent to the Post Office :—

SIR, 23rd October, 1913.

I LAID your letter of the 21st instant (118,635/13) before the Meteorological Committee yesterday, and they wished me to ask you to inform the Postmaster General that they were unaware that it was proposed to make the new charge of £100 a year for telegraphic services retrospective ; accordingly, in the Estimates for the financial year 1913–14, which were reported to the Treasury as the result of the negotiations, they have made provision only for the payment of £100 on that account within the current financial year.

They would be glad, therefore, if the account to be rendered for telegraphic services in June could be limited to the cost of the services of the current year and include a charge for one-quarter of the annual payment agreed upon.

So far as the Office accounts are concerned, a charge on account of arrears is on a different footing from the services provided for in the current Estimates, and at the present time the Committee do not know to what source of revenue they can look for meeting the payment.

I am, &c.,
W. N. SHAW.

The Secretary,
General Post Office,
London, E.C.

423. PROGRAMME OF PUBLICATIONS FOR 1914–15.—Submitted—the following :—

Periodical :

Daily Weather Report (900 to 950).

Meteorological Charts of the Atlantic Ocean (600 + 150).

Do. do. do. Indian Ocean (350 + 200).

British Meteorological and Magnetic Year Book, 1914 :

Part I.—Weekly Weather Report (375 + 75).

Quarterly and Annual Appendices (375 + 75).

Quinquennial Appendices (if not completed within current year) (600).

Part II.—Monthly Report Supplement. Monthly and Annual Summaries. 2 pp. monthly additional to provide for Scottish Stations added by the scheme of co-operation with the Scottish Society, arranged in accordance with Treasury letter 24668/12. (575 + 100 + 850 for Royal Meteorological Society, and 25 each of two Plates.)

Part III. (1).—Daily Readings at Stations of the First and Second Order. (250) Add 8 pp. of Summary.

(2).—Geophysical Journal. (375) Add one number for Annual Summary.

Part IV.—Hourly Values from Autographic Records :—

(1).—Meteorological Section (300).

(2).—Geophysical Section (375).

Part V.—Climatological Report for the British Empire or for the Globe (500).

Observer's Handbook, 1914 edition (100).

Summary of Maritime Weather Signals at present in use in the various countries of the Globe (1914 edition) (100).

Calendar, with Notes and Diary of Operations for the use of Observers, for 1914 (500).

Various papers on work completed at the Office or at the Observatories are proposed as Geophysical Memoirs. The first volume will be completed with the year 1914 with the issue of Captain Hepworth's paper on the "Effect of the Labrador Current on the Surface Temperature of the North Atlantic."

Occasional :

Atlas of Tropical Hurricanes (postponed till after 1914–15) (500 + ?).

Seasons in the British Isles, with Normals for the Four Observatories (500 + ?).

Fisherman's Handbook (500 + 2,000).

Computer's Handbook (500).

Tabulator's Handbook (500).

Memoir on the Distribution of Ice in relation to Navigation, prepared at the request of the Board of Trade.

†Twelve Monthly Charts of the South Atlantic Ocean (M.O. Press).

† Do. do. do. Davis Strait and Baffin Bay, prepared at the request of the Board of Trade (M.O. Press).

Under consideration.—An instalment of a Climatological Atlas of the British Isles (13 litho 4to plates ; about 40 pp. of letterpress and tables).

Notes.

Geophysical Memoirs (4to).—Nos. 5, 6, and 7 are now in the press. For Nos. 8, 9, and 10 the manuscript is ready and has been approved for publication by the Committee. The titles are as follows :—

†No. 8.—Lag in the Readings of Marine Barometers on Land and Sea, by Charles Chree, Sc.D., LL.D., F.R.S., Superintendent of Kew Observatory.

†No. 9.—On the relation between the Velocity of the Gradient Wind and that of the observed wind at certain of the telegraphic reporting stations, by J. Fairgrieve.

†No 10.—On the effect of the Labrador Current upon the Surface Temperature of the North Atlantic Ocean (continuation of Geophysical Memoir No. 1), by M. W. Campbell Hepworth, C.B., R.D., Commander R.N.R, Marine Superintendent.

These should be issued within the current year, and will complete Volume I. of "Geophysical Memoirs."

For the second volume, commencing with 1914, the *Seasons in the British Isles, with Normals for the Four Observatories*, should be ready and will form a large section. Other papers to the extent of 100 pp. may be expected and should be provided for.

Atlases of Charts (folio) (M.O. Press).—Monthly Meteorological Charts of the South Atlantic Ocean. Monthly Meteorological Charts of Davis Strait and Baffin Bay, prepared in connexion with inquiries by the Board of Trade concerning Ice in the North Atlantic Ocean.

The Atlas of Tropical Hurricanes will probably not be ready till after 1914–15.

Handbooks (8vo.).—*The Fisherman's Handbook* may wait until the success of the Seaman's Handbook now in the press is ascertained. *The Marine Observer's Handbook*, an octavo edition of the "Instructions for keeping the Meteorological Log" is wanted for observers immediately.

Some chapters or sheets of the *Computer's Handbook* and *Tabulator's Handbook* should be issued by 1915 in the form of Circulars ; they are urgently required, but it has not been found possible to prepare the complete copy of the Handbooks.

Memoir on the Distribution of Ice.—At the request of the Board of Trade arrangement has been made for the preparation within the year of a Memoir on the Distribution of Ice in relation to Navigation, by M. W. Campbell Hepworth, C.B., R.D., Commander R.N.R., Marine Superintendent. (B.T. Letter E. 25534 of 30th June, 1913.) The form of publication is not yet decided upon. It will probably be 4to. Litho plates might be worked at the M.O. Press. Publication would rest with the Board of Trade, but if the Board approve it might also be included in the series of Geophysical Memoirs.

Climatological Atlas of the British Isles.—Information has been received from the Royal Meteorological Society that the first part of the material for a Climatological Atlas of the British Isles, namely, that dealing with pressure, which has been compiled under the superintendence of a joint committee of the Office and Society, is now ready for press. It is suggested that there should be an arrangement between the Society and the Office as to its publication. There would be many advantages in having the lithographic work carried out at the M.O. Press. The pressure section would consist of 13 quarto lithographic plates, and about 40 pages of letterpress, introduction and tables. A definite proposal will be submitted after further consultation with the Society.

† Publications which should be issued before the close of 1913–14.

The programme of publications was approved, and it was agreed to communicate it to the Stationery Office, in connexion with the Estimate for Stationery, Printing, Binding, and Printed Books for 1914–15, which had been asked for by the Stationery Office. (Letter 4479/13.)

424. PROGRAMME OF WORK FOR 1914.—The consideration was deferred until the next meeting.

425. ESTIMATES FOR 1914–15.—Read—Treasury letter 19950/13 (M.O. 4,629) of 9th October, asking for the usual Estimate of the Expenses of the Meteorological Office for the year 1914–15 to be furnished not later than 1st December.

A letter dated 13th October, 1913, from Mr. E. Gold, Superintendent of Statistics, was read.

It was agreed that, if possible, provision should be made for the annual increment of superintendent's salaries to be increased from £12 10*s.* to £20.

Submitted—the following first draft of Estimates for the Year 1914–15 :—

METEOROLOGICAL OFFICE. ESTIMATES for the Year 1914–15.

Heads of Service.	Proposed for 1914–15.	Voted for 1913–14.	1914–15.	
			Increase.	Decrease.
	£	£	£	£
Director	1,000	1,000	—	—
Salaries : Office	10,101	9,115	986	—
Observatories	3,272	3,343	—	71
Expenses of office :				
Rent, fuel and lighting	735	735	—	—
Repairs, furniture, and incidental expenses	585	470	115	—
Postage	670	660	10	—
Telegrams	2,810	2,740	70	—
Travelling expenses	380	400	—	20
Superannuation allowances :				
Annuities per National Debt Office	1,012			
Pensions, not chargeable to Fund	425	1,496	150	—
Pensions, chargeable on Fund	209			
Contribution to Fund	541	652	—	111
Cost of instruments	2,460	2,460	—	—
Expenses of M.O. observatories	1,015	1,313	—	298
Grants, &c. to auxiliary observatories, anemograph stations, &c.	1,815	2,116	—	301
Grant for salaries, &c. of Edinburgh Office	350	350	—	—
Totals	27,380	26,850	530	—
Appropriations in aid :				
War Office	65	—	65	—
Advisory Committee for Aeronautics	165	—	165	—
M.O. observatories : Subventions	1,462	1,462	—	—
Rooms at Eskdale	76	221	—	12
" Local expenses refunded	133			
" Office expenses refunded	110	90	20	—
Departmental expenses refunded	435	455	—	20
Incidental expenses refunded	575	515	60	—
Telegraph expenses refunded	600	600	—	—
Inspections	180	160	20	—
Cost of instruments (Navy)	2,010	510	—	—
" " (other sources)		1,500		
Superannuation	1,012	887	125	—
Lectures and experiments	425	450	—	25
From balance in hand	—	—	—	—
Totals	7,248	6,850	398	—
Parliamentary Grant	20,000	20,000	—	—

426. OBSERVATORIES.—**Eskdale.**—*Proposed cottages for a mechanic in the employ of the Observatory and for a handy man in the employ of the Office of Works.*—Submitted—the following letter, which was approved :—

(C.E. 20.)

SIR, 23rd October, 1913.

I AM requested by the Meteorological Committee to ask you to bring to Their Lordships' notice a matter with reference to the buildings belonging to the Magnetic Observatory at Eskdalemuir.

The work of the Observatory has been under the administration of the Meteorological Office for three years, and the buildings have been found to be generally well suited for their purpose, with two exceptions. The one is on the technical side and is concerned with the difficult problem of keeping the underground Magnet House dry. With regard to that the Committee are regularly in communication with Mr. Oldrieve, the principal architect of the Office of Works in Edinburgh, and with his assistance, which they take this opportunity of acknowledging, they hope to arrive at a satisfactory solution.

The other is on the domestic side. The official provision for the resident staff, besides the Superintendent's House, is a double house which accommodates on the one side the Observatory mechanic and his wife, and, on the other, two or three bachelor assistants as the case may be.

The mechanic is locally in charge of the heating apparatus and the acetylene generating station, and other machinery on which the running of the Observatory is dependent as well as the scientific apparatus. The wife acts as housekeeper for the assistants. To be successful one has to find a pair who will meet both sets of requirements. To change the man and wife together means upsetting the foundations of society in the place, and temporary provision is hardly possible. The situation is obviously a difficult one, and there are many circumstances about the dual relation of the mechanic to the staff that are likely to engender friction. At present, after a stormy period, things are going smoothly, but we understand that the present arrangement cannot be expected to last for many years because the school accommodation of the neighbourhood is not regarded as adequate for the family. It is therefore desirable that the matter should now be taken up.

The proper solution appears to be to have a separate cottage for the mechanic and his family and leave the assistants' house to be placed in charge of a housekeeper and servant. This would at the same time provide accommodation for one, or perhaps two, assistants with University qualifications, which is very necessary for the work of the Observatory.

It should be mentioned that there is a great demand for small accommodation at Davington, the village nearest to the Observatory, for which there is no provision. The assignment of house accommodation is not on any economic basis, so that the cost has to be regarded from the point of view of capital outlay.

In discussing matters concerning the buildings with Mr. Oldrieve, it has transpired that it would be desirable to have a man on the spot to execute small repairs, &c. At present it is necessary to send men 18 miles from Lockerbie or Langholm. Again, the first necessity of such an arrangement is a cottage.

The Committee think that the requirements in this respect of the Observatory and of the Office of Works might be met by the erection of a pair of cottages on a plot of land just inside the Observatory enclosure.

The Committee therefore ask that Their Lordships should give favourable consideration to the suggestion that a pair of cottages should be built by the Office of Works at the Observatory.

I am, &c.,

W. N. SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W.

Valencia (Minute 385).—Reported—that an estimate (4410) of £71 for repairs to the structure and the existing turret of Valencia Observatory and for improvements to the drainage, tendered by Mr. Patrick Murphy, builder and contractor, Tralee, had been submitted by Messrs. W. H. Hill and Son, architects, and accepted by letter dated 26th September, to Messrs. Hill. It is hoped that the repairs will be completed before winter. A special provision of £75 was made in the Estimates (Minute 379).

427. DAILY WEATHER SERVICE.—**Telegrams from the Azores.**—In compliance with a wish unanimously expressed at the meeting of the International Meteorological Committee held at Rome 1913, the Director of the Meteorological Service of the Azores has arranged for daily reports from Santa Cruz (Ile de Flores), situated in latitude 39° 27′ 28″ N., longitude 31° 8′ 30″ W., at the extreme west of the Azores group of islands, to be transmitted to this country free of charge. The daily message containing the observations is despatched from Horta, whither it is forwarded by wireless telegraphy and cable, by 5 p.m. G.M.T. at latest, and it consists of 18 groups of figures, arranged as follows :—

Groups 1–8.—Observations from Santa Cruz (Ile de Flores).
Groups 9 and 10.—2 p.m. observations from Horta (*i.e.*, 4 p.m. G.M.T.).
Groups 11–18.—Observations from Ponta Delgada.

The two sets of eight groups of this message which refer to Santa Cruz and Delgada give :—
1 and 2.—Observations at 9 p.m. local = 11 p.m. G.M.T. of the previous day.
3, 4, 5, 6.—Morning observations in the usual form taken at 6 a.m. local = 8 a.m. G.M.T
7, 8.—Afternoon observations taken at 2 p.m. local = 4 p.m. G.M.T.

In addition to this the usual morning telegram is despatched from Horta (6 groups) at 6.15 a.m. local time (8.15 a.m. G.M.T.), and the telegram from Angra (Terceira) to Lisbon is continued, but it is not transmitted to London.

These arrangements took effect in their complete form from 15th October, superseding the old arrangement whereby messages were received each morning from Horta and Ponta Delgada.

In consideration of the great services rendered to the various countries of Europe by Colonel Chaves, Director of the Meteorological Institute of the Azores, the Director was authorised in his capacity as President of the International Committee to ask the Foreign Office to send a letter of thanks to the Portuguese Government.

Arrangements in time of manœuvres and war.—Read—the following letter from the Admiral Commanding Coast Guard and Reserves :—

(M.O. 4,142.)

Naval Reserves, Admiralty,
66, Victoria Street, S.W.,
5th September, 1913.

SIR,

IN further reply to your letter No. 3483/S. 2 of 26th July, 1913, relative to arrangements for continuing observations for your Department at the Coast Guard Stations at Lerwick, Malin Head, Blacksod Point, Donaghadee, Scilly, and Yarmouth during the absence of the crews, I beg to inform you that with the exception of Lerwick no difficulty has been or will be experienced at any of these stations in continuing to record and report the weather observations during manœuvres and any other occasion in peace when the crews are short-handed.

As regards Lerwick, extraneous assistance has been arranged for, to be paid for by the Coast Guard, as was done during the recent manœuvres.

I would point out, however, that with the exception of Malin Head and St. Mary's, Scilly, which would remain manned, the crews of these stations would be withdrawn in war time, and the present arrangements would of necessity lapse.

If it is considered desirable that these observations should continue to be made during war time, it would appear to be necessary that other arrangements should be made by your Department, and if desired the Coast Guard can be directed to assist in this matter by making enquiries locally.

I am, &c.,
H. H. D. TOTHILL,
for Admiral Commanding Coast Guard and Reserves.

The Director,
Meteorological Office.

It was agreed to send the following letter to the Secretary of the Admiralty :—

(C. 11.)

23rd October, 1913.

SIR,

A QUESTION has arisen with regard to the calls that are likely to be made upon this Office in time of war, and it seems desirable that it should be decided before that eventuality arrives. I take the liberty, therefore, of asking you to bring the matter to their Lordships' notice.

The daily work on the weather, which comprises reports of present weather, forecasts and storm warnings, as represented in the Daily Weather Report, is based upon readings of meteorological instruments at 31 stations in these Islands, at Gibraltar, and at about 40 stations on the continent or Atlantic Islands. Many of the British stations are, from the nature of the case, placed on the salient points on the coast remote from populous centres ; and by their Lordships' permission seven of them, viz., those at Lerwick, Malin Head, Blacksod Point, Donaghadee, Scilly (St. Mary's), Wick and Yarmouth are in charge of the Coast Guard. We depend, also, upon their Lordships for the message from Gibraltar.

Since the re-constitution of the Coast Guard temporary difficulty has arisen from time to time in consequence of the crew of one or other of the seven Coast Guard Stations referred to being withdrawn for manœuvres. This year it was Lerwick that was left and from correspondence upon this matter with the Admiral Commanding I learned that in time of war the Coast Guard would be available at two, at most, of the seven stations.

I should perhaps explain that I am now only raising the question in order that proper steps may be taken by the Meteorological Committee to provide for eventualities that can be foreseen. It is possible that upon inquiry we might find others of the stations manned by reservists, or otherwise liable to suspension in time of war. In any case it is clear that with present arrangements our organisation for the daily supply of information about the weather would fall into confusion at the outbreak of war. No doubt, the disorganisation might be more general in consequence of the interruption of the arrangements for telegraphic reports from the foreign stations, but for us the British stations have an importance of their own.

I need hardly say that, in this Office, we have not regarded an outbreak of hostilities as a time when attention to what is going on as regards weather could with advantage be suspended or relaxed ; on the contrary, it would seem that for either naval or military operations a knowledge of the present, and, so far as possible, of the future weather would be an advantage. The development of aerial navigation has brought the importance of the study of wind again into prominence. We have, therefore, been using every available opportunity of extending our knowledge of wind, fog and forecasting, so that, when the time comes, no advantage should be missed ; meanwhile the organisation for distributing information to H.M. ships and air-craft stations has been much extended.

If reliance is to be placed upon the continuance of the organisation in time of war it is clear that suitable steps must be taken. It is desirable, therefore, that we should have an authoritative

statement as to the services which this Office might be called upon to render in case of a general mobilisation, and I should be greatly obliged if their Lordships would advise me for the guidance of the Meteorological Committee as to what steps should be taken in the matter.

There is another point which may well be considered at the same time as it arises from their Lordships' request for the morning wireless message to be made up by 9.15. We find hitherto insuperable difficulties about getting our foreign messages delivered by 9.15, but it appears that the corresponding German organisation can get their list practically completed by 8.15. In these matters to be every day an hour in advance is a great advantage. I understand from the forecast division that we could get our map ready earlier if we subscribed to the German organisation instead of keeping our own system of collection. This is hardly as it should be, and while we are considering the responsibilities of the Office in war time it would be well to see whether the efficiency of our system of collection could not be improved.

I am, &c.,

Secretary of the Admiralty, W. N. SHAW.
Whitehall, S.W.

428. DIRECTOR'S REPORT AND ACCOUNTS :—

Publications.—*Annual Report.*—Copies of the Eighth Annual Report, published on 4th September, were laid on the table.

Observer's Handbook.—Proof copies of the 1913 edition of the Handbook were laid on the table. New features are an eight page art paper insertion showing different forms and sequences of clouds, printed in two colours ; a memorandum setting out the history of events which have led up to the change of meteorological units to those now employed in Parts III. and IV. of the Year Book ; and tables for conversion from values expressed in the old to the new units.

Report of the Meeting of the International Meteorological Committee, Rome, 1913.—The MS. of the English translation was laid on the table. It is proposed to include the list of institutions that present publications to the Office, and the list of recipients of Office publications as an Appendix to the International Reports in future.

Circular 001.—The list of ships which has hitherto formed Appendix IV to the Annual Report will be included with Section I of Circular 001, so as to form a complete list of observers in connexion with the Office on sea and land.

Calendar for 1914.—This is in preparation, and it is proposed to issue it to observers at the end of the year, together with Section I of Circular 001.

One Hundred Years of Rainfall in London.—The diagram prepared by Mr. Dines has been reproduced at the M.O. Press, and 500 copies delivered.

Educational.—*Meetings for discussion and lectures.*—The fortnightly meetings at the Office for discussion of important contributions to meteorology are to be resumed on Monday, 27th October, and a course of nine lectures on "The Theory of Heat in Relation to Atmospheric Changes" has been announced to begin on 23rd January, 1914, in the University of London.

Sea and Land Barometers.—The prize for meteorology offered by the Director to the cadets of the Training Ship H.M.S. "Worcester" took the form of an aneroid barometer, called a sea barometer, graduated in centibars and showing the mean pressure at various latitudes along the 30th W. meridian.

A table of frequencies of occurrence, during the ten years 1901–1910, of barometric maxima and minima in the British Isles, as represented by the observatories at Aberdeen, Valencia and Kew, has been prepared by Miss Richards, with the following results :—

Specification for average frequencies of minimum and maximum pressures over the British Isles (compiled from observations taken from "Hourly Readings" for Kew, Aberdeen and Valencia, allowing for height above sea level and corrected for latitude, assuming an average temperature of 50° F.).

Centibars.	*Frequencies.*
94—95	1 day in 15 years.
95—96	1 day in 4 years.
96—97	3 days in 2 years.
97—98	6 days a year.
98—99	20 days a year.
99–100	46 days a year.
102–103	122 days a year.
103–104	33 days a year.
104–105	2 days a year.
Above 105	1 day in 4 years.

These frequencies have now been introduced in the graduation of a dial for a Land Barometer in centibars. A specimen of the barometer is submitted.

Lecture.—At the request of the London County Council the lecture at the opening ceremony of the session of the Princess May Road Evening Institute under the new scheme of organisation of evening work was given by the Director with "the Weather" as subject.

Ice Scout.—Interim reports have been received from the Board of Trade upon the work done on the "Scotia" by Mr. Matthews (Oceanographer), Mr. Taylor (Meteorologist), and Mr. Crawshay (Biologist). Mr. Taylor's report shows that besides keeping the regular 4-hourly log and making a comparison of thermometers exposed in a screen with a ventilation-psychrometer, he has obtained a series of kite-ascents which give the temperature gradient in fog on the Grand Banks, and has also

anemometric measurements of wind velocity near the middle and at the head of the mast. Observations of sea temperature with a self-recording thermometer in accordance with Prof. Barnes' suggestion have also been obtained.

Mr. Taylor is now engaged in preparing a full report.

A meeting of the Conference which initiated the expedition of the "Scotia" was held at the Board of Trade on Monday, 20th October, Sir H. Llewellyn Smith in the chair, at which the Office was represented by the Director and Captain Hepworth. The Conference recommended the continuance of the investigation in 1914 in order to avoid a break in the work before any decision of the International Conference on the Safety of Life at Sea can be brought into effect. The proposal is that the steamship line owners and the Government should co-operate again, the line owners paying for patrol on the routes, while the Government pays for the investigation before and after the actual season of ice.

Glasgow Observatory (Minute 373).—In reply to a letter (M.O. 2,569) from the Chief Meteorologist, South Africa, the Director wrote on June 11th :—

> "It so happens that in the course of adjusting the work to the funds at their disposal the Meteorological Committee has decided to withdraw the photographic recording instruments from Glasgow and Falmouth . . . . . You will see that we have now got two sets of instruments to dispose of. One set I propose to keep here as a museum specimen ; the other is at your service if you would like to purchase it. I think that £100 would be a fair price for the thermohygrograph and barograph."

The offer was accepted [M.O. 3,983 R/S Africa].

The instruments from Glasgow are now in the office. It is proposed that after repair this set should go to South Africa.

Reports of Work for June, July, August and September, 1913.—1. *Marine Division.*—Log books and Registers.—91 Meteorological Logs ; 1 Abbreviated Log ; 6 Lighthouse Registers ; also 506 North Atlantic Registers, 312 Radio-telegraphy Registers, and 56 Indian Ocean Registers dealt with on receipt.

North Atlantic Meteorological Chart.—Issues for July, August, September and October prepared and published.

Indian Ocean Meteorological Chart.—Issues for August, September, October and November prepared and published.

Observations relative to the Arctic Regions, Davis Strait, &c.—Completion of extraction of data, totalling and meaning observations, and drawing chart.

Reports of Ice.—137 sent to "Shipping Gazette."

Corrections for Barometers obtained.—Radio-telegraphy forms, 137 ; North Atlantic Registers, 7 ; Indian Ocean Registers, 2.

Decoding 62 messages from "Scotia," and despatching them to Steamship Companies and Shipping Papers during June, July, and August.

Extraction during August of 315 sets of observations relating to selected ocean areas for the Dutch Meteorological Institute.

2. *Forecast Division.*—(1) Current work has been kept up to date.

(2) Number of wireless messages has been :—

	June.	July.	August.	September.
(*a*) From H.M. Ships	2	5	2	3
(*b*) From ships of Mercantile Marine ...	432	475	523	567

(3) Inquiries :—

Prepaid Replies	36	35	21	18
Other Telegraphic Inquiries	39	39	11	11
Wireless Inquiries	—	—	—	—
Telephone Inquiries	18	19	13	9
Personal Inquiries	2	10	1	3

(4) Corrections for Daily Weather Report issued up to August.

(5) Checking of 8 p.m. forecasts completed up to March 5th.

(6) In August a service of daily telegrams to the officers commanding at various Naval Air Stations was commenced at the request of the Admiralty.

(7) From September 20th a special report has been prepared twice a day also at the request of the Admiralty for communication by wireless to the Naval Airship Department.

3. *Statistical and Library Division.*—British Meteorological and Magnetic Year Book, 1912 and 1913.

Parts I. and II.—Weekly and Monthly Issues up to date.
Appendix I.—2nd Quarter, 1913, issued.

Part III. Section 1.—Monthly issues up to date.
Section 2.—November, 1912, issued. December, 1912, sent to printer.

Part IV. Section 1 :—
Kew, Valencia, Eskdalemuir, } 1912, copies received.
Yearly Appendix, 1912, received.

Section 2.—Aberdeen, Summaries completed for the year 1912.
Falmouth, Summaries completed for the year 1912.

The examination of the Observatory records and of the sunshine cards returned to Observers, the tabulation of cup anemograms, and the summaries of pressure-tube anemograms have been kept up to date.

Library :—	June.	July.	August	September.
Authors' cards prepared for Catalogue	82	64	27	79
Cards prepared for Subject Catalogue	83	Nil.	Nil.	125
Total number of Publications received	622	712	776	785

The shelf marks of all books have now been corrected and the corresponding changes are being made in the catalogue.

Inquiries :—	June.	July.	August.	September.
Newspapers	9	13	7	11
Legal	15	8	3	7
Scientific and Commercial	53	45	52	53
Forecasts	3	4	0	3
General	4	1	4	1
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Receipts in connexion with Inquiries ...	7 12 8	5 15 3	5 1 11	4 1 2

The returns from 74 rainfall stations have been summarised to date preparatory to the publication of the monthly totals at the end of the year.

Weather notes prepared for issue to Agricultural Shows at Gorleston, Windsor, Bristol, Peterborough, Lincoln, York, Burnley, Portmadoc, Madresfield, Warwick, Knutsford and Altrincham.

Tables for the Admiralty North Sea Pilot have been prepared for 6 stations.

The daily values of pressure at St. Helena from 1901 were corrected and copied for the United States Weather Bureau, and five-day means for the summer months from 1892 were supplied to the Cairo Meteorological Service.

The Observers' Handbook has been revised for the 1913 edition which is now in the press.

Notes for Inspectors were prepared for climatological stations, and the Inspection reports for the majority of these have been received and dealt with.

A number of diagrams were prepared for the Meteorological Exhibit at the Royal Agricultural Show at Bristol.

A selection of Charts and Diagrams illustrating weather conditions between England and Australia was sent for exhibition at the British Association Meeting at Birmingham.

4. *Instruments Division.*—Admiralty Work.—Supplies have been sent to the following Dockyards: Pembroke, Bermuda, Hong Kong, Devonport, Chatham, Cape of Good Hope, Gibraltar, Bombay, Malta, Sheerness, Portsmouth and Haulbowline.

Marine Work.—Nineteen ships have received supplies directly from the Office. The stocks of the agents at Glasgow, Liverpool, Hull and Cardiff have been replenished.

Sea-temperature stations have been provided with new thermometers in seven cases.

Fishery Barometers.—Three frames for the exhibition of fishery barometer diagrams have been issued to Scottish stations selected by the Fishery Board for Scotland, and a similar frame has gone to Mevagissey in Cornwall. Three defective fishery barometers have been replaced by good ones.

Four storm warning cones have been sent out. The instruments sent to the Observatories include a new pressure-tube anemometer for Eskdale. This is made to record wind direction as well as velocity. The old instrument from Eskdale is to be modified so that it will record direction. It will be installed at Kew. New scales for reading photobarograms in millibars have been sent to Kew, Eskdale and Valencia. The new instruments sent to Falmouth include a thermograph, a hygrograph, and earth thermometers.

About 60 requisitions from private individuals and corporations have been met.

Fourteen consignments have been sent to the colonies.

Exhibitions.—In July instruments and diagrams were sent to the Agricultural Show at Bristol.

Instruments received.—The instruments issued to the "Scotia" have been returned. These include numerous meteorographs and kites and also two aspiration psychrometers.

The photobarograph and photothermograph from Glasgow University have been brought back to London. They have been sold to the South African Government and are being restored before being sent out.

A Michelson actinometer has been purchased for use at the Office. Observations with this instrument are being compared with the records of the Callendar radiograph.

Publications.—Report for June to September, 1913, from Clerk of Publications :—

—	June.		July.		August.		September.	
	Received.	Issued.	Received.	Issued.	Received.	Issued.	Received.	Issued.
Daily Weather Report	875	855	875	836	875	830	875	850
Weekly Weather Report	375	321	375	322	375	323	375	322
Monthly Weather Report, &c.	575 (May)	467 (May)	575 (June)	466 (June)	575 (July)	469 (July)	575 (Aug.)	466 (Aug.)
Do. Do. (Maps)	25 „	2 „	25 „	2 „	25 „	2 „	25 „	2 „
Do. Do. Title Page, &c. 1912	575	466	—	—	—	—	—	—
Daily Readings	75 (Jan.) 75 (Feb.)	43 (Jan.) 51 (Feb.)	75 (March)	51 (March)	75 (April) 75 (May) 75 (June)	51 (April) 51 (May) 51 (June)	75 (July)	51 (July)
Geophysical Journal, 1912	150 (Aug.)	133 (Aug.)	150 (Sept.)	133 (Sept.)	150 (Oct.)	133 (Oct.)	150 (Nov.)	133 (Nov.)
Hourly Values—Meteorological, 1912—Kew	300 (Oct.)	11 (Sept. & Oct.)	—	—	300 (Nov.)	11 (Nov.)	300 (Dec.)	11 (Dec.)
Eskdale	300 (Oct. & Nov.)	11 „ „	300 (Dec.)	—	—	11 „	—	11 „
Valencia	300 (Nov.)	11 „ „	300 „	—	—	11 „	—	11 „
Do. —Yearly Values, 1912 ...	—	—	—	—	—	—	300	11
Do. —Geophysical, 1911	—	—	—	—	—	—	—	—
Monthly Meteorological Charts (Atlantic) ...	600 (monthly) to July (3).	508	600 (monthly) to August (3).	582	600 (monthly) to Sept. (3).	526	600 (monthly) to Oct. (2).	508
(Indian) ...	—	292	350 (Aug. & Sept.)	322	—	175	350 (Oct. & Nov.)	307
International Upper Air Observations, 1911	50 (April & May)	30 (April & May)	50 (June)	30 (June)	50 (July & Aug.)	30 (July & Aug.)	—	—
Seventh Annual Report	—	1	—	1	—	—	—	—
Eighth Do. Do.	—	—	—	—	—	—	450	304
Observer's Handbook (1911)	12	3	—	1	—	3	—	—
"Forecasting Weather"	—	1	—	—	—	—	—	—
Cloud Atlas	—	2	—	—	—	—	—	—
Report—Commission for Weather Telegraphy	—	—	—	—	—	—	—	1
Do. do. Maritime Meteorology	—	—	—	—	—	—	—	—
Codes of Signals	—	2	125 (1913 edition)	—	—	5	—	73
Calendar, 1913	—	1	—	—	—	1	—	—
Structure of the Atmosphere	—	—	—	—	—	—	—	2
Geophysical Memoirs, No. 1	—	1	—	—	—	2	—	—
No. 2	—	1	—	—	—	—	—	—
No. 3	—	1	—	—	—	1	—	—
No. 4	—	1	—	—	—	—	—	—

Receipts from sales at M.O.—June, £1 12*s.* 9*d.*; July, 9*s.*; August, 6*s.* 9*d.*; September, 19*s.* 11*d.*

New Publications.—75 copies of the new edition of "Instructions for Meteorological Telegraphy" have been printed off and issued to telegraphic reporting stations.

Copies of the 1913 edition of the "Codes of Signals" have been received and issued to maritime meteorological institutes, &c.

The "Observers' Handbook," 1913 edition, is in the press (*see* beginning of Minute 428).

For other new issues *see* beginning of Minute 428.

M. O. Press.—During the four months ended 30th September, 1913, the issue of the periodical publications has been as follows :—Daily Weather Report, maps for the Weekly Weather Report, maps for the Monthly Weather Report, Monthly Meteorological Charts of the North Atlantic, Monthly Meteorological Charts of the Indian Ocean, as contract.

On 1st June there was one requisition for forms outstanding. Since that date ten requisitions have been issued and ten discharged, leaving one requisition still on hand.

Twenty additional copies of the Daily Weather Report have been printed during the period in compliance with requests received from Educational Authorities.

Branch Office (Mr. J. S. Dines's Report for June, July, August).—During the three months I have spent 4 weeks on inspection work, 3½ weeks in the forecast branch of the Meteorological Office, and 4 weeks on holiday.

I have corrected the proof of the Fourth Report on Wind Structure so far as this has been received from the printers.

The services of Mr. Wise were transferred for three weeks to Kew Observatory. He has been away for one week on holiday.

The regular analysis and tabulation work has been kept up to date, and the comparison of surface with gradient winds for different stations has been continued.

The daily sunshine figures for the 30-year period 1881–1910 at Kew have been copied for the Statistical Branch of the Meteorological Office.

(September).—Four pilot balloons have been sent up.

The remaining part of the proof of the Fourth Report on Wind Structure has been received from the printers during the month. The revision of the whole has now been completed and the matter returned for printing.

A list of all papers of importance in aerological work which have been published in the Quarterly Journal of the Royal Meteorological Society during the period 1881–1910 has been prepared.

In company with Mr. Gordon Dobson, of the Central Flying School, I visited six of the principal stations in Germany at which forecasting and other work for the use of aviators is carried out. A joint report has been prepared dealing with the work and equipment of these stations.

Mr. Billett has been employed at the Office during the month. He has conducted several pilot balloon ascents, worked out examples of upper-air calculus, and spent some time in the forecast division.

The regular analysis and tabulation work has been kept up to date, and the daily sunshine figures for 30 years at Valencia have been copied out on form 331.

Mr. Wise has been away for 3½ days on holiday.

Observatories—Kew (June).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	3
	Inclination	3
	Horizontal Force	2
Potential Gradient		7 days.
Wilson Apparatus		10 „
Pyrheliometer		7 „

International cloud observations were made on three days.

A scale value determination was made of the electrograph, and the scale value of the portable electrometer was redetermined at the National Physical Laboratory. The portable electrometer unfortunately had an accident a few days after the scale value determination, and has had to be sent to Messrs. Kelvin and James White, Glasgow, for repairs. Its absence is the cause of the small number of observations of potential gradient.

In view of the approaching alterations to the building the following movements have occurred :—Most of the staff to the old "Clinical House"; the magnetographs to the "Experimental House"; the float barograph and the half-seconds clock to the north room of the "Clinical House"; the Shelton clock to the "platinum thermometer" room ; pressure-tube anemometer to the hut near the gate ; most of the books, old instruments, busts, &c., to the "Packing House"; some books, records and pictures to the "Clinical House."

The movement of the magnetographs was executed by Mr. P. Adie, the sole serious accident being the breaking of the declination magnet suspension. Owing to the stretching of the new suspension there was some loss of trace beyond that necessitated by the actual time of transfer. The conditions in the Experimental House, owing to the large daily range of temperature, are very unfavourable for the working of the horizontal and vertical force instruments, and it is much to be regretted that the magnetographs will be exposed to these conditions for at least one month longer than if the building operations had begun on June 1st, the date by which I was instructed to have the movement of the instruments concluded.

The movement of the float barograph was supervised by Mr. Baker, lent by Mr. W. H. Dines for the occasion. The platinum wire was unfortunately broken, but a repair was effected. The pressure tube was moved by Messrs. Eldridge, valuable assistance being given by Mr. Wise, who was lent for three weeks by Mr. J. S. Dines. A scale value determination made after the movement was completed showed that a serious error existed for which no explanation has been found, and correspondence has been passing on the subject with the Office and Mr. R. W. Munro.

The books, pictures, busts and old instruments were moved by the Army and Navy Stores. Their men showed great consideration, but there was inevitably considerable interference with the work, and still more with the comfort of the staff.

The telephone has also been moved from the main building to the Clinical House.

Mr. Richardson concluded his stay at the Observatory, in the course of which he devoted most of his time to practising magnetic observations. He had not, when he left, attained to any very great facility in the use of the instruments, especially the dip circle, and additional practice will be necessary before he attains the speed of a practised observer. He took with him when he left unifilar No. 140 and dip circle No. 120, which have been a good deal missed since in connection with the verification of instruments.

The following instruments have been verified :—

2 collimator magnets (wth inertia bars) sent by Istituto Idrografico, Genoa.
4 dip needles " " " "
6 liquid compasses.
15 compass cards (including 3 retested after rejection).

The Eskdalemuir dip circle No. 74 was left at the Observatory by Dr. Harker. After taking some observations with its needles in the circle itself, and the Kew circle, circle No. 74 was sent to Mr. Dover for overhaul.

Two collimator and two mirror magnets (for Manila Obervatory) were received in an unfinished state from Messrs. Elliott Brothers, and an interview was granted to one of their employees to explain what required to be done before the magnets could be accepted for verification.

A unifilar and a dip circle belonging to the Observatorio D. Luiz of Lisbon were at the request of their owners examined superficially, and Mr. Dover—who visited the observatory and discussed details—was given written instructions as to the necessary alterations to put the instruments in working order. They are to be verified on return from Mr. Dover.

Mr. Boxall was absent half a day on sick leave ; Mr. Francis was absent one day on special leave (acting as juryman at Kingston), and has been absent on regular holiday since the 23rd. Under the circumstances a larger portion than usual of the verification work has fallen on the Superintendent.

Mr. Harris left for Eskdalemuir at the end of May, being replaced by Mr. Skelton who has been receiving some instruction in magnetic observations besides being trained in the ordinary photographic work.

(July.)—The barograph, thermograph, and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	5	
	Inclination	5	
	Horizontal force	5	
Wilson apparatus	on	14	days.
Pyrheliometer	"	3	"

Owing to the absence of the portable electrometer at Glasgow for repairs, no observations of absolute potential gradient have been made. International cloud observations were made on three days. A number of observations were taken with the Eskdalemuir dip circle No. 74 and its needles, before and after alterations made by Mr. Dover.

The builders commenced work in the second week of June, and since then observational work has been more difficult and less satisfactory than usual. This applies especially to the electrograph, whose readings of late have doubtless been sensibly affected by the presence of planks and ladders and workmen thereon washing down and knocking holes in the old building.

The pyrheliometer was dismounted on July 7th to make way for the builders.

Six compass cards have been tested.

Photographic paper has been sent to Aberdeen, Eskdalemuir and Oxford.

Mr. Francis was absent on holiday in the early part of July and Mr. E. Boxall is away on holiday at present.

(August.)—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorogical data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	4	
	Inclination	4	
	Horizontal force	4	
Wilson apparatus	on	16	days.

The portable electrometers not having returned from Glasgow no observations of potential gradient have been made.

International cloud observations were made on three days.

The usual list of earthquakes for the first six months of the year 1913 was got out and sent to the Secretary of the Earthquake Committee of the British Association.

Owing to the necessity of providing for the building operations the seismograph was dismounted and stored on August 8th.

Two theodolite compasses were tested and two compass cards.

Photographic paper was supplied to Eskdalemuir.

The Superintendent left on holiday on July 30th.

Mr. E. Boxall returned from his holiday on August 3rd.

Building operations are advancing, but the upper floor rooms are not yet ready for the caretaker or resident observer.

(September.)—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	6	
	Inclination	7	
	Horizontal force...	5	
Potential gradient	on	13	days.
Wilson apparatus	„	7	„

International cloud observations have been made on three days.

The magnetic and electrical tables for 1912 have been completed and sent to the Office.

One of the two portable electrometers sent for repair to Glasgow in June has been received back. An opportunity has not yet occurred to have its scale value determined at Teddington, and use is being made meantime of a value supplied by the maker.

Tests have been concluded on a Lloyd-Creak dip circle with 12 needles, one compass card and two theodolite compasses (one of which was rejected and passed on second test after alteration.)

Photographic paper has been supplied to Eskdalemuir.

The building operations have sufficiently advanced to admit of the caretaker's moving to his new apartments on the upper floor, and the resident observer's room is now ready to receive furniture, some of which has arrived.

Mr. Stewart has had some practice in magnetic and electrical obeservations. Mr. Skelton has also had a little further practice in magnetic observations.

Mr. Boxall has been away ill on medical certificate for nearly a fortnight.

Mr. Wright (of the National Antarctic Expedition) has been observing for three days with some of the magnetic instruments used in the Antarctic.

Investigation of the Upper Air (Mr. W. H. Dines's report for quarter ended June, 1913).—The ordinary work of the station was carried on as usual. Owing to the unexpected request for various articles in connection with the voyage of the "Scotia" the stock of balloon meteorographs was exhausted, and it was with some difficulty that sufficient could be made in time to meet the demand caused by the international work of 5th–12th May.

Instead of going to Crinan as usual for the week I went to Eskdalemuir Observatory and sent up nine balloons. Excepting that cloudy weather prevented any observations with a theodolite the result was most successful since eight were recovered. This was owing to a persistent S.E. type of weather which carried the balloons over the mainland of Scotland and not out to the North Sea.

The good fortune experienced at Pyrton Hill in the previous quarter has continued and in all, including Eskdalemuir, out of 25 instruments sent up, four only have been lost. Six instruments were supplied to the Joint Kite Committee and sent up by Father O'Leary at Limerick. All six were reported, but two of the finders cannot be induced to return the instruments they are known to have found. The 25 instruments returned all gave satisfactory traces, but the average height reached was less than usual.

Accounts.—Submitted—The following statement of the Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on 31st May, 1913	3,349	18	9
Receipts from 1st June to 30th September, 1913	6,969	14	9
	10,319	13	6
Cheques drawn from 1st June to 30th September, 1913	8,623	15	2
Balance on 30th September, 1913	1,695	18	4

Submitted—The following Statement of Accounts for the Quarter ending 30th June, 1913 :—

RECEIPTS.						PAYMENTS.					
1912.				1913.		1912.				1913.	
£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
404 6 4	Balance from year 1912–13	—		95 17 9		250 0 0	Director	—		250 0 0	
4,250 0 0	Parliamentary vote..	—		5,000 0 0			OFFICE SALARIES (including Insurance) :				
	M.O. OBSERVATORIES :					1,877 11 3	Monthly	1,910 10 2			
						243 0 8	Weekly	235 4 8			
122 13 3	Kew	104 9 9								2,145 14 10	
123 6 0	Eskdalemuir ...	500 0 0					OBSERVATORIES :				
44 17 6	Valencia	14 7 11				449 14 5	Kew	431 11 10			
200 0 0	Farnborough ...	—				343 19 11	Eskdalemuir	287 4 1			
35 8 6	Sale of Forms, &c.	26 16 0				167 4 2	Valencia	127 8 4			
				645 13 8		73 10 0	Farnborough	76 8 9			
	DEPARTMENTAL EXPENSES REPAID :									922 13 0	
49 4 2	Forecasts, &c. ...	52 11 0					OFFICE EXPENSES :				
	Marine, Statistics, and Observa-					178 10 10	Rent, Fuel, &c. ...	173 12 2			
33 10 8	tories	29 7 9				110 11 3	Furniture, Fittings, &c.	31 6 11			
14 3 5	Instruments ...	15 17 7				133 11 7	Incidental Expenses	151 18 1			
				97 16 4						356 17 2	
	INCIDENTAL EXPENSES REPAID :						POSTAGE :				
						73 14 10	General Postage ...	68 5 11			
97 7 9	Forecasts, &c. ...	104 5 1					Postage of Daily				
18 10 10	Other Branches ...	32 4 4				90 12 4	Weather Reports ...	97 14 1			
	Stationery Office									166 0 0	
10 13 9	Account ...	16 2 5				642 4 8	TELEGRAMS, &C. ...	—		91 1 2	
				152 11 10							
	TELEGRAPH CHARGES REPAID :					102 10 5	TRAVELLING EXPENSES (INSPECTIONS, &C.)	—		178 0 0	
80 10 4	Home	148 18 4									
	Telegrams sent						SUPERANNUATION :				
40 19 7	abroad	78 15 3				178 15 0	Funded annuities ...	205 4 6			
				227 13 7			Non-funded pensions				
	INSTRUMENTS :					158 6 3	and fund	158 17 9			
7 10 0	Royal Navy ...	2 2 6								364 2 3	
	Mercantile Marine,						COST OF INSTRUMENTS:				
625 16 0	Stations, &c. ...	864 6 2				175 2 11	Royal Navy	245 13 11			
				866 8 8			Mercantile Marine,				
76 0 0	INSPECTIONS ...	—		114 19 6		513 18 1	Stations, &c. ...	625 5 9			
										870 19 8	
	SUPERANNUATION ACCOUNT :					439 15 1	AUXILIARY OBSERVATORIES, &C.	510 11 0			
178 15 0	Annuities	178 15 0					Lectures and Experi-				
	Interest on Invest-					87 10 0	ments	—			
13 4 10	ments	13 4 10								510 11 0	
	Income Tax re-						BALANCE :				
8 15 0	turned	—				251 6 11	Cash at Bank ...	1,499 17 7			
				191 19 10		30 1 6	,, at Office ...	69 2 0			
	LECTURES AND EXPERIMENTS ...	—					Advance for Inspec-				
135 19 2				61 17 6		—	tions	30 0 0			
										1,598 19 7	
£6,571 12 1				£7,454 18 8		£6,571 12 1				£7,454 18 8	

LIABILITIES.			ASSETS.		
£ s. d.		£ s. d.	£ s. d.		£ s. d.
1,544 8 4	To sundry creditors	2,183 8 0	281 8 5	By cash at Bank and at Office ...	1,598 19 7
—	,, superannuation	135 5 0	192 12 11	,, Admiralty	268 11 5
173 2 6	,, balance	616 15 11	—	,, salaries reserved	0 2 9
			501 1 10	,, M.O. Instruments in Stock ...	377 2 7
			742 7 8	,, sundry debtors	690 12 7
£1,717 10 10		£2,935 8 11	£1,717 10 10		£2,935 8 11

NOTE.—On 30th June the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £602 14*s.* 5*d.*

Observatories.—Statement of Accounts for the Quarter ended 30th June, 1913:—

KEW.

1912.	*Receipts.*	1913.
£ s. d.		£ s. d.
—	Gassiot Trust	—
93 15 0	National Physical Laboratory ...	93 15 0
2 10 0	Grazing Rents	2 10 0
26 8 3	Miscellaneous	8 4 9
327 1 2	To Balance	327 2 1
£449 14 5		£431 11 10

1912.	*Payments.*	1913.
£ s. d.		£ s. d.
206 10 10	Superintendent	206 10 10
104 4 0	Assistants	111 12 11
22 14 9	Caretaker	25 12 8
4 10 0	Sundays and holidays	3 16 8
23 12 9	Overtime	21 0 0
23 19 6	Rent, fuel, and lighting	20 15 8
0 8 8	Repairs...	—
6 5 0	Insurance	9 17 0
21 11 0	Materials	9 11 5
15 4 5	Instruments	1 1 0
—	Books, printing, and stationery ...	13 6
20 13 6	Incidental expenses ...	21 0 2
£449 14 5		£431 11 10

ESKDALE.

1912.		1913.
£ s. d.		£ s. d.
—	Royal Society (Parliamentary) Grant)	500 0 0
108 6 8	Salary of Assistant in Seismology to 31st March, 1913	—
14 19 4	Miscellaneous	—
220 12 11	To Balance	—
£343 19 11		£500 0 0

1912.			1913.
£ s. d.		£ s. d.	£ s. d.
100 0 0	Superintendent		—
117 5 0	Assistants		119 11 8
18 18 0	Mechanic and Caretaker		31 7 3
13 0 0	Handyman		13 3 3
1 18 3	Books, stationery, &c. ...		—
4 17 6	Insurance		14 8 4
2 6 2	Travelling expenses ...		3 5 4
	Incidental expenses:—		
—	Furniture, &c. ...	59 13 11	
—	Instruments and repairs	12 10 8	
16 14 10	Photographic paper ...	16 3 9	
—	Coals and carriage of coals, light	14 0 3	
61 14 4	Repairs, &c.	1 13 10	
7 5 10	Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	1 5 10	
			105 8 3
—	Balance	—	212 15 11
£343 19 11			£500 0 0

VALENCIA.

1912.		1913.
£ s. d.		£ s. d.
36 2 6	Royal Society (magnetic observations)	5 12 11
8 15 0	Grazing Rent	8 15 0
122 6 8	To Balance	113 0 5
£167 4 2		£127 8 4

1912.		1913.
£ s. d.		£ s. d.
68 15 0	Superintendent	68 15 0
30 5 0	Assistants	30 11 5
36 0 0	Magnetic observations	—
—	Rent, rates, and taxes	—
13 5 0	Private wire	13 5 0
18 19 2	Miscellaneous expenses	14 16 11
£167 4 2		£127 8 4

FARNBOROUGH.

1912.		1913.
£ s. d.		£ s. d.
209 0 0	Advisory Committee	—
—	To Balance	76 8 9
£200 0 0		£76 8 9

1912.		1913.
£ s. d.		£ s. d.
56 5 0	Meteorologist	62 10 0
17 5 0	Other Expenses	13 18 9
126 10 0	By Balance	—
£200 0 0		£76 8 9

Submitted—The following Statement of Accounts for the six months ending 30th September, 1913 :—

RECEIPTS.						PAYMENTS.					
1912. £ s. d.		£ s. d.	£ s. d.	1913. £ s. d.		1912. £ s. d.		£ s. d.	£ s. d.	1913. £ s. d.	
404 6 4	Balance from year 1912–13	—	95 17 9			500 0 0	Director	—		500 0 0	
8,500 0 0	Parliamentary vote	—	10,000 0 0				OFFICE SALARIES (including Insurance) :				
	M.O. OBSERVATORIES :					3,807 9 2	Monthly	3,837 6 5			
377 0 8	Kew	336 7 5				438 19 2	Weekly	463 11 7			
635 6 5	Eskdalemuir ...	602 14 0								4,300 18 0	
44 17 6	Valencia	14 7 11					M.O. OBSERVATORIES :				
200 0 0	Farnborough ...	—				869 11 6	Kew	864 13 1			
60 0 9	Sale of Forms, &c.	65 9 9				764 7 5	Eskdalemuir ...	891 10 2			
			1,018 19 1			280 12 4	Valencia	246 4 11			
	DEPARTMENTAL EXPENSES REPAID :					149 16 9	Farnborough ...	203 4 4			
90 13 6	Forecasts, &c. ...	92 4 4								2,205 12 6	
	Marine, Statistics, and Observa-						OFFICE EXPENSES :				
53 3 10	tories	55 14 1				350 4 10	Rent, Fuel, &c. ...	345 0 8			
						119 18 5	Furniture, Fittings, &c....	224 14 10			
30 19 2	Instruments ...	26 3 0									
			174 1 5			186 4 11	Incidental Expenses	199 18 6			
	INCIDENTAL EXPENSES REPAID :									769 14 0	
178 4 11	Forecasts, &c. ...	198 15 9					POSTAGE :				
						151 16 3	General Postage ...	138 3 5			
36 16 7	Other Branches ...	50 6 0					Postage of Daily				
	Stationery Office					177 11 7	Weather Reports...	200 1 9			
18 18 1	Account ...	25 16 2								338 5 2	
			274 17 11			1,005 13 11	TELEGRAMS, &C. ...	—		545 12 6	
	TELEGRAPH CHARGES REPAID :										
124 10 0	Home	251 11 2					TRAVELLING EXPENSES				
	Telegrams sent					239 5 11	(INSPECTIONS, &C.)	—		379 6 9	
304 0 8	abroad	328 18 0									
			580 9 2				SUPERANNUATION :				
	INSTRUMENTS :					357 10 0	Funded annuities ...	410 9 6			
7 10 0	Royal Navy ...	2 2 6									
	Mercantile Marine,						Non-funded pensions				
1,213 4 8	Stations, &c. ...	1,082 16 0				316 12 6	and fund	317 3 6			
			1,084 18 6							727 13 0	
140 0 0	INSPECTIONS ...	—	154 13 0				COST OF INSTRUMENTS :				
						244 17 0	Royal Navy	572 11 5			
	SUPERANNUATION ACCOUNT :						Mercantile Marine,				
357 10 0	Annuities... ...	383 19 9				1,273 7 4	Stations, &c. ...	915 0 7			
	Interest on Invest-									1,487 12 0	
26 9 8	ments	17 0 2					AUXILIARY OBSERVATORIES, &C.				
	Income Tax re-					985 8 5		1,041 8 5			
8 15 0	turned	—									
			400 19 11			175 0 0	Lectures and Experiments	—			
	LECTURES AND EXPERIMENTS ...									1,041 8 5	
147 19 9		—	73 15 0				BALANCE :				
						528 12 9	Cash at Bank ...	1,695 18 4			
	FURNITURE, FITTINGS, &C. ...										
—		—	186 11 6			37 7 4	,, at Office ...	53 2 7			
										1,749 0 11	
£12,960 7 6			£14,045 3 3			£12,960 7 6				£14,045 3 3	

LIABILITIES.						ASSETS.					
£ s. d.			£ s. d.			£ s. d.			£ s. d.		
2,018 15 5	To sundry creditors		2,874 8 2			566 0 1	By cash at Bank and at Office ...		1,749 0 11		
6 2 3	,, salaries reserved		11 2 3			287 7 0	,, Admiralty		620 8 11		
						272 2 5	,, M.O. instruments in stock ...		583 10 1		
—	,, superannuation		270 10 0			970 3 9	,, sundry debtors		685 14 2		
70 15 7	,, balance		482 13 8								
£2,095 13 3			£3,638 14 1			£2,095 13 3			£3,638 14 1		

NOTE.—On 30th September the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £602 14*s.* 5*d.*

Observatories.—Statement of Accounts for the Six months ended 30th September, 1913 :—

KEW.

1912.	*Receipts.*	1913.
£ s. d.		£ s. d.
235 14 2	Gassiot Trust	212 7 2
93 15 0	National Physical Laboratory ...	97 2 6
2 10 0	Grazing Rents	2 10 0
45 1 6	Miscellaneous	24 7 9
492 10 10	To Balance	528 5 8
£869 11 6		£864 13 1

1912.	*Payments.*	1913.
£ s. d.		£ s. d.
356 10 10	Superintendent	356 10 10
208 2 0	Assistants	245 5 9
47 6 6	Caretaker	50 11 11
8 0 0	Sundays and holidays	7 14 9
46 2 9	Overtime	45 19 0
42 18 6	Rent, fuel, and lighting	39 16 9
4 17 8	Repairs, furniture, &c.	21 14 3
7 2 9	Insurance	9 19 0
34 14 7	Materials	19 0 4
79 19 2	Instruments	12 10 11
—	Books, printing, and stationery ...	13 6
33 16 9	Incidental expenses...	54 16 1
£869 11 6		£864 13 1

ESKDALE.

£ s. d.		£ s. d.
500 0 0	Royal Society (Parliamentary Grant)	500 0 0
108 6 8	Salary of Assistant in Seismology	100 0 0
26 19 9	Miscellaneous	2 14 0
129 1 0	To Balance	288 16 2
£764 7 5		£891 10 2

£ s. d.		£ s. d.	£ s. d.
200 0 0	Superintendent		191 13 4
250 4 4	Assistants...		233 19 2
47 12 5	Mechanic and Caretaker		62 14 6
25 17 4	Handyman		26 6 6
7 6 0	Books, stationery, &c. ...		—
5 19 8	Insurance		14 8 4
14 16 10	Travelling expenses ...		84 12 9
	Incidental expenses :—		
28 15 0	Rental of private wire	—	
16 11 0	Instruments and repairs	12 15 8	
29 15 10	Photographic paper ...	30 8 1	
55 4 6	Coals and carriage of coals, light	46 11 0	
61 14 4	Repairs, furniture, &c.	65 10 9	
20 10 2	Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	12 10 1	
—	Purchase of motor car ...	110 0 0	277 15 7
£764 7 5			£891 10 2

VALENCIA.

£ s. d.		£ s. d.
36 2 6	Royal Society (magnetic observations)	5 12 11
8 15 0	Grazing Rent	8 15 0
235 14 10	To Balance	231 17 0
£280 12 4		£246 4 11

£ s. d.		£ s. d.
137 10 0	Superintendent	137 10 0
60 5 2	Assistants	61 2 11
36 0 0	Magnetic observations	—
5 7 8	Rent, rates, and taxes	5 4 8
13 5 0	Private wire	13 5 0
28 4 6	Miscellaneous expenses	29 2 4
£280 12 4		£246 4 11

FARNBOROUGH.

£ s. d.		£ s. d.
200 0 0	Advisory Committee	—
—	To Balance	203 4 4
£200 0 0		£203 4 4

£ s. d.		£ s. d.
112 10 0	Meteorologist	125 0 0
—	Assistant	32 6 4
37 6 9	Other Expenses	45 18 0
50 3 3	By Balance	—
£200 0 0		£203 4 4

FIFTY-SECOND MEETING.

South Kensington, S.W., 26th November, 1913.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

CAPTAIN LYONS. | MR. MIDDLETON.

DR. SCHUSTER.

429. The Minutes (419–428) of the last Meeting (22nd October, 1913) were read and confirmed.

430. CORRESPONDENCE. — **Banking Account** (Minute 420).—The following draft letter to the Treasury was approved :—

(C. 06.)

SIR,

THE attention of the Meteorological Committee has been called to the present arrangements for the banking account of the funds in charge of the Meteorological Office.

In pursuance of the Treasury Minute of 20th May, 1905, the collection and disbursement of these funds is managed by means of a *public account* at the Bank of England, Western Branch, controlled by Their Lordships and operated by means of cheques signed by W. N. Shaw, as Director of the Office, and J. A. Curtis, as Cashier.

It has been represented to the Committee that since the removal of the Office to South Kensington the distance from the Bank in Burlington Gardens has become inconvenient. The matter is of some indirect importance in the payment of salaries to the members of the staff who wish their cheques cashed on pay day. This involves fetching a good deal of cash from Burlington Gardens to South Kensington.

The Committee think it would be advisable to move the banking account from the Bank of England to the Brompton Road Branch of the London County and Westminster Bank, which is close to the Office.

The Committee have no reason to think that the facilities for dealing with the monies entrusted to them would be in any way restricted by the change. On the contrary various additional means of safeguarding the distribution of the money would be opened up.

They therefore desire me to ask you to submit for Their Lordships' consideration and approval a proposal that a Public Account should be opened for the Meteorological Committee with the London County and Westminster Bank, Limited, at their Branch in Brompton Road, instead of as heretofore at the Western Branch of the Bank of England.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury.

Stonyhurst (Minute 345).—It was agreed that a letter should be written to the Rev. W. Sidgreaves, S.J., Stonyhurst College, stating that the Committee are willing to allow the self-recording meteorological instruments to remain there for such time as they are kept in regular operation.

Sale of Daily and Weekly Weather Reports.—The Director was requested to report on the advisability of advertising the Daily and Weekly Reports in the weekly press in in order to bring them to the notice of persons who are likely to be interested in them.

Forecasts for the Royal Yacht.—Read—letter 5022 (F.N. 01) from the Commodore of the Royal Yacht thanking for weather forecasts and reports supplied during the year, and stating that the information has been of the greatest assistance.

431. OFFICE STAFF.—**Establishment of the clerical and technical staff.**—Read—a statement showing, in tabular form, a comparison between the numbers in the various grades of the combined staffs of the office and observatories in 1897 (Minutes 1898–9, p. 77) and in 1913.

It was agreed that provision should be made on the staff of classified clerks for four women, of whom one should be rated as "Clerk," and the others rated as "Computers," if or as soon as their salary under present regulation reaches £75 a year.

It was further agreed—

(1) that at the next vacancies the Superintendent of Valencia Observatory and the Forecast Assistants now rated as first-class clerks be rated as Senior Professional Assistants (Meteorologists) and be no longer included in the establishment of classified clerks.

(2) that as soon as practicable the establishment of classified clerks, inclusive of the female staff above mentioned, consist of 36, of whom 12 will be rated either as principal clerks or staff assistants, eight as clerks, eight as clerk assistants, and eight as clerk computers.

(3) that, in consideration of the increase of establishment, provision be made as soon as practicable for the increase of the contribution to the fund for the Superannuation allowances for classified clerks from £750 a year to £900 a year.

(4) that for the financial year 1915–16 and thereafter, the increment of the several ratings should be £7 10*s.* per annum instead of £5 as heretofore.

Promotions.—The following promotions were approved, to take effect upon the retirement of Mr. J. A. Curtis, Chief Clerk and Cashier on 1st April, 1914.

Mr. T. D. Bell, principal assistant and librarian to be chief clerk with duties to be assigned by the Director at a salary of £300 a year rising to £330.

Mr. J. Sheerman, now second class clerk, to be principal assistant in the statistical division.

Mr. E. L. Ardley, clerk assistant and registrar of documents, to be cashier and to rank as "assistant."

Miss Anderson.—Reported—that in compliance with Minute 421, a letter has been written to Miss Anderson on 4th November stating that, if she preferred it, a sum of £35 per annum, payable monthly, and commencing with January, 1914, would be allowed in lieu of the present provision which includes the accumulation at the Post Office of deferred pay, viz., £87 19*s.* 10*d.*, and the additional £200 ordered by Minute 179.

Read—letter 5103 (3) of 22nd November from Miss Anderson, stating that she is not in a position to relinquish the deferred pay, and asking if the Committee could increase the grant of £200 in view of her many years of service in the Meteorological Office.

It was agreed to reply that the funds at the Post Office are at Miss Anderson's disposal, and that if she prefers it the Committee are willing to grant an annuity of £25 a year in lieu of the £200 assigned by Minute 179, to be payable on the conditions of payment of the superannuation allowances of classified clerks (Circular 002, April 1913).

432. New Office.—**Post Office Charges** (Minute 422).—Read—the following letter from the Post Office:—

M.O. 5251.

General Post Office,
London,
14th November, 1913.

Sir,

With reference to your letter of the 23rd ultimo, No. 4827/T.C. 01, regarding the transmission from the Central Telegraph Office to the Meteorological Office of certain foreign telegrams, I am directed by the Postmaster General to state that the proportion of the commuted charge of £100 a year payable for the quarter ended the 30th of June, 1913, in respect of such telegrams has been included in the general account of the Meteorological Office for that quarter.

An account for arrears up to the 31st March, 1913, is enclosed, but the Postmaster General will offer no objection to payment of this account being deferred until the beginning of the next financial year, or, if preferred, to the sum due being recorded, as an exceptional arrangement, against "Scientific Investigations, &c.," provided that the Meteorological Office obtain Treasury authority for the adoption of the latter course.

I am, &c.,
A. B. Walkley.

The Director,
Meteorological Office.

[The account is for a sum of £242 7*s.* 10*d.*]

It was agreed to ask for the sanction of the Treasury for the sum to be recorded against "Scientific Investigations, &c." in the letter forwarding the Estimates for 1914–15.

Telephones.—*Supply of forecasts and other information by telephone.*—Submitted—the following memorandum :—

Meteorological Office,
25th November, 1913.

TELEPHONES.

Notice has been received from the Controller of the Telephone Service that an additional exchange line is required for the Office in consequence of the number of calls from subscribers which have to be refused owing to the Office line being occupied. The Office telephone number does not appear in the directory ; the calls are those from subscribers who have private information as to the Office number.

Internal extension lines have been wanted for the Secretary and the Superintendent of the Instruments Division, and provision has been taken for them, but the order has not been given on account of the difficulty of deciding upon the best place for the Office switch board and the best arrangement for the Office telephone service generally, and for offering facilities to telephone subscribers for obtaining forecasts and other information by telephone.

The proper way of meeting the requirements appears to be to set up a local telephone office of our own with a proper staff.

For the telephone office it is suggested that the north end of the corridor which leads to the Forecast Room (Room 25) might be used and screened off for the purpose by a glass screen leading from the wall beyond the Tea Room door. It has light and warming and the formation of a kind of lobby to the Forecast Room would be an advantage.

The telephone office would be under the regulations which are set out below. One additional member of the Staff of the Forecast Division would be required (to be in attendance for 12 hours).

Meteorological Office Telephones.

The Telephone Office would be in charge of a clerk assistant, with two probationers or boy clerks as assistants, attached to the Forecast Division.

The hours of attendance would be from 8 a.m. to 8.30 or 9 p.m.

The Office exchange lines would appear in the Telephone directory under two numbers :—

Western wxyz Meteorological Office Forecasts.
„ 2166 Meteorological Office Secretary.

Subscribers to the Post Office telephones who had made a deposit with the Office to cover the fees payable would be entitled to ring up " Meteorological Office Forecasts " and, upon giving name and number, to obtain the latest information about the weather or a forecast, at a minimum fee of 3*d.* Other persons would also be allowed to make a similar deposit and receive a Meteorological Office number for the purpose of identification, and upon giving name and Meteorological Office number through a telephone from a public call office or elsewhere they would be entitled to receive information on the same scale of charges.

Notice would be inserted in the telephone directory as follows :—

Meteorological Office Forecasts.

Telephone subscribers, who have made a deposit with the Meteorological Office to cover the charges payable, can obtain the latest reports available, in reply to enquiry by telephone, as to the state of the weather over the British Isles and the state of the sea on their coasts and forecasts of weather at a minimum charge of 3*d.* for a forecast for a single district. For further information apply to the Meteorological Office, Exhibition Road, S.W.

or,

Meteorological Office : Forecasts and Weather Reports.

The telephone line for forecasts is available only for those subscribers who have a deposit at the Meteorological Office to cover the charges payable. For information apply to the Meteorological Office, Exhibition Road, S.W.

The minimum deposit would be 1*s.* which would entitle the subscriber to the reply to one call Additional calls would be charged

3*d.* each for a forecast for a single district and the further outlook if any, or for a report from a single station.
6*d.* for reports from two stations or separate forecasts for two districts.
1*s.* for the set of forecasts, general inference and further outlook.
2*s.* for a special report by the forecaster in charge.

A list of the names and numbers of telephone subscribers who have a deposit will be kept in the Meteorological Office Telephone Office, and on receipt of a message to " Forecasts " the operator will ask for and verify the name and number of the subscriber, and after supplying the information required will book the charge against the subscriber's deposit account. If he is unable to verify the name and number he will ring off.

No messages from the general public except enquiries for forecasts will be dealt with over the forecast line and messages on other Office business will be dealt with over the other line and enquirers will be instructed to ring off and ring up the right number.

For example, if anyone wishing to speak to the Director rings up wxyz (Meteorological Office Forecasts) he is to be asked to ring off and ring up Western 2166.

The cost to the Office of the Forecast Telephone Service will be for a single line :—

	£	s.
Rent of first line	17	10
Cost of Attendance	82	10
	100	0

The addition of a second forecast line would add a cost of about £60.

To guard against loss, therefore, by 3*d.* messages, not less thau 30 messages a day would have to be dealt with on the first line. They would be distributed mainly over the morning hours before 11, between 2 and 3 and from 7.30 to 9 p.m. If uniformly distributed over these five hours, calls would have to be dealt with at the rate of six per hour. One line could easily take this number of calls.

Note.—One of the assistant superintendent engineers of the Post Office has suggested informally that it would be quite feasible for the Post Office to undertake the collection of the fees from telephone subscribers provided that, for avoiding fraud, the transaction comprised a double call, the first from the subscriber to the Office and the second from the Office to the subscriber's number, giving the information. This proposal could be combined with that outlined above in the manner set out in the following draft circular.

METEOROLOGICAL OFFICE.

Forecasts and Weather Reports by Telephone.

Special telephone lines, No. wxyz Western, are maintained for the purpose of replying by telephone to enquiries for the latest reports as the state of the weather in any part of the United Kingdom and the state of the sea in the Channel and on the Coasts of Britain and Northern Europe and for forecasts of wind or weather.

It may be noted that reports of barometer, wind and weather are regularly received from stations three times a day, viz. : between 7.30 and 8 a.m., between 1.15 p.m. and 2 p.m., between 6.15 and 7 p.m. and forecasts are prepared at 9.30 a.m., 2.30 p.m. and 7.30 p.m.

The following is the scale of charges :—

For the latest forecast for any one of the twelve districts of the United Kingdom and the further outlook (if any), or for a report from a single station	3*d.*
For forecasts for two separate districts or for reports from two stations	6*d.*
For the set of forecasts, general inference and further outlook	1*s.*
For a special report by the Forecast Official in charge	2*s.*

The telephone line is only available for those who have made a deposit to cover the charges payable. By arrangement with the Post Office subscribers to the London Telephone System may have the charges defrayed from their deposit with the Postmaster General for additional calls, telegrams, &c. In order to obtain the information subscribers must notify the Meteorological Office by telephone or otherwise stating at what time the information is to be telephoned and what items are to be covered. The Meteorological Office will then call the subscriber's number and give the information.

For the convenience of those who are not subscribers to the London Telephone System, deposits may be made with the Director of the Meteorological Office and, with the same of charges, information will be supplied by telephone in reply to enquiries received by telephone or otherwise from persons on the Office list who give their name and number.

Applications by telephone to the Meteorological Office for forecasts must be made through number wxyz Western.

The rental of a second circuit and the installation of a telephone office in the lobby near the forecast room were approved.

The scale of charges for the supply of forecasts &c. by telephone was approved as set out in the memorandum, and it was agreed to include a sum of £100, divided between "Salaries" and "Telephones," in the estimates for 1914-15 to cover the cost of the service outlined in the memorandum, and a sum of £50 under Appropriations in Aid for the new item "Telephone Service of Forecasts."

433. PROGRAMME OF WORK FOR 1914.—Submitted—the following :—

PROGRAMME OF WORK FOR 1914.

The programme of ordinary work has been practically dealt with in the Programme of Publications. The work of the year will be placed in an improved position by the increase in the Parliamentary Grant, which (with subventions from the Advisory Committee for Aeronautics and from the Board of Trade) has provided for the continuation of the appointment of a Seismologist at Eskdalemuir, and of five Professional Assistants, of whom two are at the Office (one for the *réseau mondial* and one to assist in the preparation and passing through the press of occasional publications), one is at Kew especially for Magnetism, and the other two are attached to the Forecast Division, one as Meteorologist alternately at the Office and at one of the observing stations, generally at Falmouth, and the other as experimentalist for the work of the Advisory Committee for Aeronautics at South Farnborough. The money received from the publication funds of the Scott Antarctic Expedition in consideration of Dr. Chree's services, has provided the means for appointing a sixth professional assistant for a year. He is also attached to Kew Observatory.

Other new features of the work of the year are :—

(1) The new experimental work at Falmouth, begun in October, 1913, in accordance with a scheme set out in Minute 405, and experimental work at South Farnborough for the Advisory Committee for Aeronautics.

(2) The changes in the International Code approved by the International Meteorological Committee, which are due to be introduced on 1st May, 1914.

(3) The incorporation of the observations from stations of the Scottish Meteorological Society, in accordance with the scheme for a Meteorological Office in Edinburgh (Minute 393).

(4) The further prosecution of iuvestigations connected with the distribution of ice, by the Board of Trade, which is closely associated with the Marine Division.

(5) The collating and charting of Monthly Salinity and Surface Temperature observations in the North Atlantic, initiated in connexion with investigations being carried out by the Fishery Branch of the Board of Agriculture and Fisheries.

(6) The commencement of effective work in connexion with the *réseau mondial.*

(7) The provision of suitable instruments, tables of reduction, &c., for the use of new units of pressure, baromils and millibars.

(8) The change of practice at Kew Observatory, which is a natural consequence of the provision of accommodation for a resident observer, and the installation of apparatus in the North Hall which will enable the observer to watch the progress of geophysical events of various kinds.

(9) The commencement on 1st January of reports by telegraph from Eskdale Observatory, for which provision has already been made.

(10) Revised arrangements for the aerological work carried on by Mr. W. H. Dines, which are necessitated by his having to leave Pyrton Hill.

(11) In connexion with these changes the formal application from the German Government through the Foreign Office for the initiation of daily soundings with pilot balloons has to be taken in hand.

(12) The extension of the area represented by the daily telegraphic reports to Latitude 78° N. by the telegrams from Spitzbergen and Vardö necessitates the recasting of the form of the Daily Weather Report. A revised form is already prepared.

In order to facilitate these new developments, the distribution of the work of the Office between the several Divisions has been re-arranged. It is desirable to see how the new distribution works in practice before taking up the consideration of the various items of the programme as set out in previous years.

The Observatories.

Kew Observatory.—Provision has been made for the appointment of a professional assistant with special reference to Terrestrial Magnetism, who will act as resident observer, occupying the room provided for that purpose by the alterations. The equipment of the Observatory with pen-recording apparatus in the North Hall to enable an observer to keep himself informed as to the actual progress of events is proceeding.

An additional professional assistant has been appointed for one year in consideration of the attention given by the Superintendent to the reduction and discussion of the magnetic observations of the British Antarctic Expedition.

Provision is still required for a workshop and mechanical assistant. One of the out-buildings has been assigned for that purpose, but the £250 included in the estimates for the re-equipment of the observatory has already been spent.

The library requires special consideration. The greater part of it is in the form of unbound numbers and the resources of the Observatory are not sufficient to make up the arrears. The only plan seems to be to raise a fund by private subscription for putting the library into proper working order.

Eskdale Observatory.—Provision has been made for the continuance of the appointment of a professional assistant for seismology, and a boy-clerk has been added to the staff in order that the additional work necessary for the Observatory to take part in the Daily Weather Service may not cause delay in other sides of the activity of the Observatory.

By the beginning of the year it is hoped that the practice with regard to the method of dealing with the various observations will have become settled and have been set down in writing as part of the Tabulator's Handbook. When that has been achieved it will be easier to preserve continuity.

Sir J. Larmor has suggested that a North and South Earth-current-wire with a means of recording very small currents should be set up in order to detect, if possible, the periods of free oscillation conditioned by the atmosphere acting as a condenser between ionised air above and the earth below. The longest period, computed from the formula $\frac{1}{1\cdot 2}$ (circumference ÷ velocity of light), would be about one-tenth of a second.

Valencia Observatory.—No change is contemplated in the work at present undertaken at Valencia. The Superintendent will reach the age limit for retirement before the close of the financial year 1914–15, and the consideration of the future work of the Observatory may be postponed until a decision is taken as to the circumstances arising in connexion therewith.

The programme of work was approved.

434. Estimates for 1914–15. (Minute 425). **Storm Warnings.**—Submitted—a memorandum on the cost of maintenance of storm signal stations and the cost of transmission of the telegrams distributing the signals.

It was agreed that the suggestion should be made in the letter to the Treasury forwarding the Estimates that the cost of telegraphy for storm warnings should be borne by the Departments of Trade and Fisheries, instead of by the Office.

Commission for the Supply of Instruments.—Submitted—a memorandum proposing that the Commission for the supply of instruments to Colonial Governments and private persons should be increased from $2\frac{1}{2}$ per cent. and 5 per cent. respectively to 5 per cent and 10 per cent. respectively.

Approved.

In view of the changes indicated in Minutes 425, 431, 432 and the present Minute, the draft estimates printed in Minute 425 were amended and approved in the following form :—

METEOROLOGICAL OFFICE.

FINAL ESTIMATES for the YEAR 1914–15.

Heads of Service.	Proposed for 1914-15.	Voted for 1913-14.	1914-15.	
			Increase.	Decrease.
	£	£	£	£
Director	1,000	1,000	—	—
Salaries : Office (including Farnborough) ...	9,944	9,115	829	—
Observatories	3,398	3,343	55	—
Expenses of Office :				
Rent, fuel and lighting	700	735	—	35
Repairs, furniture, and incidental expenses	450	410	40	—
Postage	670	660	10	—
Telephones	78	60	18	—
Telegrams	2,790	2,740	50	—
Travelling expenses	380	400	—	20
Expenses of M. O. Observatories :				
Rent, fuel, and lighting	253	218	35	—
Repairs, furniture, and equipment	280	455	—	175
Incidental expenses	656	548	108	—
Private wires and telephones...	52	52	—	—
Travelling expenses	50	40	10	—
Superannuation allowances :				
Annuities	1,012	862	150	—
Pensions not chargeable on fund	425	425	—	—
Pensions chargeable on fund	209	209	—	—
Contribution to fund	541	541	—	—
„ „ (contingent)	—	111	—	111
Cost of Instruments	2,650	2,460	190	—
Grants to auxiliary observatories, anemograph stations, &c.	1,756	2,116	—	360
Grant for salaries &c.—Edinburgh Office ...	350	350	—	—
Totals	27,644	26,850	794	—
Appropriations in aid :				
Subventions : Advisory Committee for Aeronautics.	250	—	250	—
Observatories (per War Office)	65	—	65	—
Observatories (per Royal Society)	1,462	1,462	—	—
Observatories : Local expenses refunded ...	209	221	—	12
M. O. „ „ ...	111	90	21	—
Departmental expenses refunded	490	455	35	—
Incidental expenses refunded	575	515	60	—
Telegraphic expenses refunded...	615	600	15	—
Telephone service of forecasts	50	—	50	—
Inspections...	180	160	20	—
Costs of instruments (Navy)	700	510	190	—
„ „ „ (other sources) ...	1,500	1,500	—	—
Superannuation annuities	1,012	887	125	—
Lectures and experiments	425	450	—	25
Totals	7,644	6,850	794	—
Grant in aid	20,000	20,000	—	—

METEOROLOGICAL OFFICE.

PROVISIONAL STATEMENT OF CHARGES UPON THE GRANT FOR 1914–15 REQUIRED FOR WORK SANCTIONED FOR THE YEAR.

I.—SALARIES, including normal increases: OFFICE AND OBSERVATORIES (Salaries marked * are affected by Allowances).

Establishment.	—	Administration and Library.	I. Marine Division.	II. Forecast Division.	III. Statistical Division.	IV. Instruments Division.	Kew.	Eskdale.	Valencia.	Falmouth.	Farnborough.	Pyrton Hill.	Total. 1914–15.
		£	£	£	£	£	£	£	£	£	£	£	£
	Director £1,000	...	...	...	...	...	...	...	...	...	...	...	1,000
	Secretary	350	...	...	...	...	...	...	...	...	...	...	350
	Professional Staff:												
7	Superintendents	...	450	470	470	500	657	425*	...	...	...	...	(7) 2,972
7	Senior Professional Assistants	...	...	(3) 887	...	...	...	230	287	...	F	200	(7) 1,604
5	Junior Professional Assistants	(2) 165† 140	...	(2) 330	...	...	140*	...	...	F	F	...	(5) 775
1	Graduate Assistants	100	...	...	...	...	...	...	...	...	...	...	100
	Classified Clerical and Technical Staff:												
12	¶Chief Clerk and Assistants	(2) 475	(2) 480	(3§) 316	(3) 590	200	(2)360	...	(1§)	...	...	...	2,421
8	¶Clerks and Mechanical Assistants	(1) 150	(2) 280	(2) 336	(3) 410	(2) 298	...	...	...	...	...	...	1,474
8	¶Clerk Assistants	(2) 125† 113	...	141	83	...	...	113*	...	...	...	...	575
8	¶Clerk Computers	(2) 160†	(1) 80	(2) 208	...	...	...	93*	...	...	...	...	541
	Allowance for Vacancies and Revision	(1) 55	...	...	...	...	...	5	...	...	...	...	60
	Additional Staff:												
	Mechanical Assistants	...	...	...	...	...	...	...	...	...	65	140	205
	Supernumerary Clerks	(1) 70†	...	...	(2) 155	...	...	...	82	60	...	...	367
	Probationers	(2) 96	(2) 96	(1) 56	44	...	44 52	...	...	...	...	...	388
	Boy Clerks	(1) 48	(2) 88	...	44	...	...	36	...	...	...	...	216
	Office or Laboratory Boys	(2) 56	...	...	40	52	...	...	...	...	...	...	148
	Add for Telephone Staff	...	...	82	...	...	...	...	...	...	...	...	82
	Office Keeper's Staff:	14	9	10	12	4	4	3	1	1	1	1	210
	Office Keepers	(2) 198	...	...	...	...	...	...	...	...	...	...	198
	Caretakers	...	...	...	...	...	82*	130*	...	...	...	...	212
	Messengers	(2) 140	...	...	...	52	...	52	39	...	...	...	283
	Boy Messengers	(2) 52	...	...	...	...	...	...	...	...	...	...	52
	Cleaners	122	...	...	...	...	...	53	33	...	...	...	208
	Watchman	28	...	...	...	...	...	...	...	...	...	...	28
	Lift Attendant	53	...	...	...	...	...	...	...	...	...	...	53
	Occasional Sunday Duty	10	...	...	...	...	20	...	...	...	...	...	30
	Meteorological Office, Edinburgh (*See* Schedule II.)	...	..	...	...	...	...	...	...	...	...	...	...
	TOTALS £1,000	2,706	1,474	2,826	1,836	1,102	1,355	1,137	441	60	65	340	14,342
						9,944						3,398	

† Female staff. ¶ Excepted from the provisions of the Insurance Act, 1911. F Included in Forecast Division.

§ Three of the salaries assigned here to Senior Professional Assistants are graded as "First Class Clerkships."

II.—CHARGES upon the GRANT (exclusive of Salaries).

	Administration and Library.		Lectures and Experiments.		Inspections.		I.—Marine.		II.—Forecasts and Storm Warnings.		III.—Climatology and Statistics.		IV.—Instruments, and unassigned.		No.	Total.	
	£	£	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Office Expenses.																	
Rent, Fuel, and Lighting	650	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attendance on Heating and Lighting Apparatus (H.M.O.W.)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		700	...	...	...	...	...	...	...	...	...	...	...	...	...	...	700
Repairs and Furniture	200	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Incidental Expenses (exclusive of Postage):—																	
Carriage of Parcels	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Books and Printing (inclusive of S.O.P.)	120	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Office-Keeper Contingencies	90	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		450	...	...	...	...	...	...	...	...	...	...	...	...	...	...	450
Postage	...	300	...	...	...	...	...	...	...	370	...	...	...	...	...	...	670
Telephones, &c.	...	78	...	...	...	...	...	...	...	...	...	...	...	...	...	...	78
Telegrams from Inland Stations and H.M. Ships	...	...	...	...	...	...	...	...	600	...	...	...	...	...	...	...	...
" from Mercantile Marine	...	...	...	...	...	...	...	...	340	...	...	...	...	...	...	...	...
" from Abroad	...	...	...	...	...	...	...	...	450	...	...	...	...	...	...	...	...
" " New P.O. charge	...	...	...	...	...	...	...	...	100	...	...	...	...	...	...	...	...
" sent Abroad	...	...	...	...	...	...	...	...	530	...	...	...	...	...	...	...	...
" Storm Warnings	...	...	...	...	...	...	...	...	350	...	...	...	...	...	...	...	...
" Hay Harvest Forecasts	...	...	...	...	...	...	...	...	80	...	...	...	...	...	...	...	...
" Sundries, Forecasts, &c.	...	...	...	...	...	...	...	...	130	...	...	...	...	...	...	...	...
Allowances to Clerks	...	...	...	...	...	...	...	...	210	...	...	...	...	...	...	...	...
										2,790	...	...	...	...	...	...	2,790
Travelling Expenses.																	
Committee, &c.	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Representatives at International Meetings	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Inspectors, M.O.	...	...	...	...	310	...	...	...	...	...	...	...	...	...	...	...	...
		70	...	...		310	...	...	...	...	...	...	...	...	...	...	380
Observatories, Kew, Eskdale, Valencia, Falmouth, Farnborough, and Fyrton Hill (expenses exclusive of salaries) ... £1,291	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,291
Superannuation.																	
Pensions not chargeable on fund	400	...	...	...	...	...	...	...	...	...	...	...	25	...	...	...	425
Annuities	300	...	...	...	...	...	300	...	150	...	112	...	150	...	...	...	1,012
Pensions chargeable on fund	73	...	...	...	...	...	...	...	76	...	...	...	60	...	...	...	209
		(4) 773	...	...	...	...		(2) 300		(2) 226		(1) 112		(2) 235	11	...	...
Contribution to fund	...	541	...	...	...	...	...	...	...	...	...	...	...	...	...	...	541
Cost of Instruments.																	
Royal Navy	...	...	...	...	...	...	...	...	...	...	...	...	700	...	...	...	...
For Office use	...	...	...	...	...	...	...	...	...	...	...	...	450	...	...	...	...
Other Commissions	...	...	...	...	...	...	...	...	...	...	...	...	1,500	...	...	...	...
														2,650	...	...	2,650

Grants to Auxiliary Observatories, Observers, &c.																			
Aberdeen Observatory	...	...	...	...	...	...	...	...	...	...	...	...	295	...	...	...	...		
Armagh do.	...	...	...	...	...	...	...	...	...	...	...	...	50	...	...	...	...		
Anemograph Stations (including St. Helena)	...	...	...	...	...	...	...	...	...	...	...	...	(7) 70	...	...	...	...		
														415	9	415	...		
Incidental Expenses, Forms, &c.	...	...	...	...	...	...	...	...	...	...	...	...	...	210	...	210	..		
Reporters at Telegraphic Stations	...	...	...	...	...	...	...	...	...	600	...	...	...	...	26	600	...		
Meteorological Societies :—																			
British Rainfall Organization	...	...	...	...	...	...	...	...	...	...	25	...	...	...	...	...	...		
Royal Meteorological Society	...	...	...	...	...	...	...	...	...	...	50	...	...	...	...	...	...		
												75	...	...	...	75	...		
Schuster Reader	...	...	...	350	...	...	...	...	...	...	...	...	...	...	1	350	...		
Agents' Fees (Marine)...	...	...	...	...	...	...	...	75	...	...	...	...	...	...	...	75	...		
Presentation Labels	...	...	...	...	...	...	...	6	...	...	..	...	...	...	...	6	...		
Lectures, &c.	...	...	...	25	...	...	...	...	...	...	...	...	...	...	...	25	...		
																	1,756		
Grant for Salaries &c., Edinburgh Office ... £350	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	350		
Total Expenses exclusive of salaries ...£1,641	...	2,912	...	375	...	310	...	381	...	3,986	...	187	...	3,510	...	...	13,302		
Salaries (Observatories) £3,398	...	2,706	...	...	...	...	...	1,474	...	2,826	...	1,836	...	1,102	...	...	14,342		
.. (Office) £1,000	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...		
Totals (*Dr.*) £6,039	...	5,618	...	375	...	310	...	1,855	...	6,812	...	2,023	...	4,612	...	...	27,644		

III.—Estimated Appropriations in Aid.

	£	£	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Subventions.																	
Advisory Committee for Aeronautics	...	...	...	...	...	...	...	...	...	250	...	...	...	...	..	...	250
Observatories per War Office £65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	65
,, ,, Royal Society £1,462	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,462
Observatories.																	
Local Expenses refunded £209	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	209
,, M.O. Expenses refunded	...	...	...	...	...	...	...	...	...	...	...	...	...	111	...	...	111
Office Expenses Refunded.																	
Departmental	...	105	...	...	...	...	...	5	...	160	...	50	...	170	...	...	490
Incidental	...	50	...	...	...	...	...	...	...	450	...	...	...	25	...	525	...
Stationery Office	...	50	...	...	...	...	...	...	...	...	...	...	...	...	...	50	575
Telegrams.																	
Home	...	...	...	...	...	...	...	...	...	235	...	...	...	...	...	...	...
Foreign	...	...	...	...	...	...	...	...	...	380	...	...	...	...	...	...	615
Telephone.																	
Forecast Service	...	...	...	...	...	...	...	...	...	50	...	...	...	...	...	...	50
Inspections	...	...	...	...	...	180	...	...	...	...	...	...	...	...	...	...	180
Instruments.																	
Navy	...	...	...	...	...	...	...	...	...	...	...	...	...	700	...	...	700
Other Sources	...	...	...	...	...	...	...	...	...	...	...	...	...	1,500	...	...	1,500
Superannuation.																	
Annuity Receipts	...	(2) 300	...	...	...	...	...	(2) 300	...	(1) 150	...	(1) 112	...	(1) 150	...	..	1,012
Interest on fund	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lectures and Experiments.																	...
Schuster Readership	...	...	...	350	...	...	...	...	...	...	...	...	...	...	...	...	...
Other Sources	...	...	...	75	...	...	...	...	...	...	...	...	...	...	...	...	425
Totals (*Cr.*) £1,736	...	505	...	425	...	180	...	305	...	1,675	...	162	...	2,655	...	...	7,644
NET EXPENDITURE £4,303	...	5,113	...	(Cr.) 50	...	130	...	1,550	...	5,137	...	1,861	...	1,956		...	20,000
Parliamentary Grant	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	20,000

IV.—Meteorological Office Observatories.

Estimated Expenses for 1914–15.

—	Kew.		Eskdale.		Valencia.		Falmouth.		Farnborough.		Pyrton Hill.		Totals.	
	1914–15.	1913–14.	1914–15.	1913–14.	1914–15.	1913–14.	1914–15.	1913–14.	1914–15.	1913–14.	1914–15.	1913–14.	1914–15.	1913–14.
	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Salaries (*see* I.)	1,355	1,271	1,137	1,120	441	442	60	—	65	315	340	330	3,398	3,478
Other Expenses.														
Rent, Fuel, and Lighting	100	120	100	75	23	23	30	—	—	—	—	—	253	218
Repairs, Furniture, Equipment, and Insurance	135	260	95	95	50	120	—	—	—	—	—	—	280	475
Materials	60	60	60	55	—	—	52	—	—	—	—	—	172	487
Books, Printing and Stationery	15	15	25	25	—	—	—	—	—	—	—	—	40	
Incidental Expenses	50	70	45	45	30	12	59	—	100	85	110	120	394	
Contribution to International Publication	—	—	—	—	—	—	—	—	—	—	50	50	50	50
Private Wire and Telephone	—	—	30	30	13	13	9	—	—	—	—	—	52	43
Travelling Expenses	—	—	50	40	—	—	—	—	—	—	—	—	50	40
Total Expenses exclusive of Salaries	360	525	405	365	116	168	150	—	100	85	160	170	1,291	1,313
Appropriations in Aid.														
Subventions.	£	£	£	£	£	£	£	£	£	£	£	£	£	£
War Office	—	—	—	—	—	—	—	—	65	—	—	—	65	—
Royal Society	—	—	—	200	—	—	—	—	—	—	—	—	—	—
Parliamentary Grant	—	—	1,000	1,000	—	—	—	—	—	—	—	—	—	—
Gassiot Fund	450	450	—	—	—	—	—	—	—	—	—	—	—	—
Rosse Fund	—	—	—	—	12	12	—	—	—	—	—	—	—	—
National Physical Laboratory	—	50	—	—	—	—	—	—	—	400	—	—	—	—
													1,462	2,112
Expenses Refunded Locally.														
Grazing Rent	5	5	—	—	18	18	—	—	—	—	—	—	—	—
Testing Instruments	50	—	—	—	—	—	—	—	—	—	—	—	—	—
Commissions	60	85	—	—	—	—	—	—	—	—	—	—	—	—
Rent of Rooms	—	—	76	—	—	—	—	—	—	—	—	—	—	—
													209	108

435. Office Stations.—**Glasgow** (Minute 373).—Reported—that since 1st May, 1913, reports have been received from a station in Springburn Park, Glasgow, by arrangement with the Glasgow Corporation, following on a visit of the Director on 18th March, 1913. The station is in charge of Mr. Robert Thompson under the supervision of James Whitton, Esq., Superintendent of Parks for the Glasgow Corporation. The payments set out in S2 25th March, 1913, are as follows :—

	£	s.	d.
Primary work of a telegraphic station	15	10	0
Additional observations at 1 p.m. and 9 p.m.	3	15	0
Telegram at 6 p.m.	1	5	0
Care of Barograph...	1	10	0
Care of Thermograph	1	10	0
Care of Sunshine Recorder	3	0	0
Bonus	3	3	0
	29	13	0

The new station takes the place of the Observatory at Glasgow, which is no longer in connection with the Office. The apparatus belonging to the Office there (with the exception of the photographic barograph and thermograph) has been sold to the University of Glasgow for £51. The barograph and thermograph after repair by Negretti and Zambra at an estimated cost of £17 10*s.* 0*d.* have been sold to the South African Government for £100.

Reported further—that the grass minimum thermometer at the Glasgow station was stolen on the evening of Saturday, 11th October, 1913, and had been replaced.

436. Daily Weather Service.—**Messages from Vardö.**—Reported—that observations from Vardö had been received daily since 1st October, 1913, and that a new map had been prepared for the Daily Weather Report providing for the extension of the area represented to latitude 80° N.

Distribution of Meteorological Intelligence for Naval Aircraft.—Read—Letter 5389 (F.A. 01) from the Director of the Air Department, Admiralty inquiring whether there is any accommodation at the Meteorological Office that could be used as an Office for Lord Dunboyne. Lord Dunboyne has been appointed by the Admiralty to assist in the distribution of meteorological intelligence to the Naval Air Stations.

It was agreed to express the regret of the Committee that there was no room available in the office, and to suggest that accommodation might be provided by the Office of Works in the block of houses in Cromwell Road, opposite the Victoria and Albert Museum. One of these houses has lately been occupied by the Royal Geographical Society.

437. Meteorological Office, Edinburgh.—Reported—that the Secretary of the Edinburgh Committee had expressed a wish to receive printed copies of the Minutes of the Edinburgh Committee for circulation to members of that Committee. The Minutes are being printed in the Minutes of the Meteorological Committee, and it is suggested that 25 separate copies of the Edinburgh Minutes should be ordered for this purpose.

Approved.

438. PUBLICATIONS.—Submitted—the following :—

RETURN of PUBLICATIONS issued by the METEOROLOGICAL COMMITTEE during the financial year 1912–13, showing in each case the COST of PRINTING, &c., and the AMOUNTS RECOVERED by SALES during the year.

1911–12.		Publication.	1912–13.	
Cost of Printing and Paper.	Sales through Stationery Office Agents.		Cost of Printing and Paper.	Sales through Stationery Office Agents.
£ s. d.	£ s. d.		£ s. d.	£ s. d.
*79 2 10	—	Minutes of Proceedings of the Meteorological Committee	—	—
499 3 1	—	Daily Weather Report	521 17 8	—
15 11 5	—	„ „ „ Appendix to		—
†461 19 10	46 12 4	Weekly Weather Report (including Monthly and Annual Summaries)...	‡522 15 6	45 18 0
43 10 5	—	Weekly Weather Report, Appendix to	43 4 2	—
76 17 0	—	Daily Readings	78 10 8	—
31 5 6	—	Geophysical Journal	66 13 6	—
§106 12 10	—	Hourly Values : Meteorological ...	96 3 6	—
‖6 5 0	—	„ „ Geophysical ...	53 5 9	—
247 1 11	11 10 0	Meteorological Charts of the North Atlantic Ocean	263 0 8	13 0 4
201 6 4	7 19 0	Meteorological Charts of the Indian Ocean	193 8 2	10 14 4
¶64 7 0	13 19 0	Annual Report, with Appendices ...	**54 3 5	10 7 10
26 3 6	††12 16 0	Observers' Handbook...	—	‡‡14 0 0
31 8 4	—	Meteorological Log	31 19 2	—
—	—	Geophysical Memoirs...	37 4 2	—
—	—	Barometer Manual	151 12 1	26 1 4
—	—	Report of Commission for Weather Telegraphy, 1912	16 14 2	1 9 4
—	—	Report of Commission for Maritime Meteorology and Storm Warnings, 1912	13 4 7	0 14 0
2 16 5	—	Aeronautics : Extract from Second Report	—	—
49 4 3	1 10 0	International Meteorological Committee. Report of 9th Meeting ...	—	—
§§1,949 15 8	94 6 4		‖‖2,143 17 2	122 5 2
	23 6 5	Miscellaneous Sales of earlier Publications		7 9 5
	52 9 9	Sales by Meteorological Office ...		59 8 1
	170 2 6			189 2 8

* This amount is for the two years 1910–1911 and 1911–12.
† This amount includes the sum of £1 1*s.* 8*d.*, the cost of copies supplied to the Royal Meteorological Society on repayment.
‡ This amount includes the sum of £27 15*s.* 11*d.*, the cost of copies supplied to the Royal Meteorological Society on repayment.
§ For January to October, 1911, only.
‖ For specimen sheet only.
¶ This amount includes the sum of £39 17*s.* 4*d.*, the cost of copies supplied to the Meteorological Office on repayment.
** This amount includes the sum of £26 14*s.* 5*d.*, the cost of copies supplied to the Meteorological Office on repayment.
†† This amount is the sum realised by sales of the 1910 edition.
‡‡ This amount is the sum realised by sales of the 1911 edition.
§§ This amount includes the sum of £1,537, the cost of Official Publications supplied to the Meteorological Office for Departmental use, &c., during 1911–12.
‖‖ This amount includes the sum of £1,666, the cost of Official Publications supplied to the Meteorological Office for Departmental use, &c., during 1912–13.

STATEMENT showing the EXPENDITURE by H.M. STATIONERY OFFICE for PRINTING, STATIONERY, &c., for the METEOROLOGICAL OFFICE.

—	Printing.	Paper.	Binding.	Books.	Stores.	Total.
	£	£	£	£	£	£
1911–12	1,529*	348*	180*	7	32	2,096*
1912–13	1,658*	457*	123*	18	27	2,283*

* These amounts include the cost of copies of Official Publications supplied for Departmental purposes.

439. Director's Report and Accounts :—

Tornado in South Wales.—Reported—that at the urgent representation of Mr. Clement Edwards, M.P., Mr. Billett had been detailed to go down to Pontypridd, the scene of the tornado on 27th October, and make investigations on the spot. Mr. Billett has drawn up a report on the phenomenon, and a special report is now being prepared in the Office for publication.

Publications.—Reported—that after correspondence with the Copyright Receipt Office, British Museum, it had transpired that the museum did not receive official publications of the Office which are on sale at the Meteorological Office only, except the Daily Weather Report, which is regularly forwarded to the museum by the Stationery Office. It has been arranged to forward regularly to the museum a copy of Parts III. and IV. of the Year Book and also the Geophysical Memoirs as issued.

Reports of Work (October, 1913).—1. *Marine Division.*—Examined 25 new Meteorological Logs, 1 Abbreviated Log, and 1 Lighthouse Register.

Monthly Meteorological Charts of the North Atlantic and Mediterranean.—Issue for November published and chart for December sent to lithographer. Drawing inset charts for weekly issues. Charting Sea and Air Temperatures for August, September and October. Registering and acknowledging observations, issuing charts and renewing supply of forms. Received 147 North Atlantic Registers, Form 121, and 77 Radio-telegraphy Registers, Form 138.

Monthly Meteorological Charts of the Indian Ocean.—Issue for December, 1913, published, and issue for January, 1914, in course of preparation. Received 13 reports of Indian Ocean weather, Form 122.

Wireless Telegrams from Ships.—Preparing weekly list of sailings. Extracting and tabulating marine observations, also preparing each week a sea temperature chart of the North Atlantic. Obtaining corrections for 40 barometers. Acknowledging reports, and issuing copies of instructions and observation forms.

Reports of Ice sent to Shipping Gazette.—47.

Monthly Meteorological Chart of Davis Strait and Baffin Bay.—Drawing wind-roses. Checking completed data. Completing the totalling and meaning of observations.

Observational Duties.—Time occupied, 25 hours.

Extraction of Observations relating to selected Ocean Areas for the Dutch Meteorological Institute and for the Indian Government.—16 hours and 2 hours respectively.

2. *Forecast Division.*—(1) Current work has been kept up to date.

(2) Number of wireless messages has been :—

	October.
(*a*) From H.M. Ships	3
(*b*) From ships of Mercantile Marine	567

(3) Inquiries :—

Prepaid Replies	16
Other telegraphic Inquiries	11
Wireless Inquiries	—
Telephone Inquiries	5
Personal Inquiries	—

(4) Corrections for Daily Weather Report issued up to September.

(5) Checking of 8 p.m. Forecasts completed up to April 2nd.

(6) Working charts completed for binding up to June 30th.

(7) At the request of the Navy Air Department, Lord Dunboyne, late R.N., attended in order to familiarise himself with the work done in the Forecast Division on behalf of H.M. Naval and Military Services. A statement for the use of Lord Dunboyne has been prepared (*see* Case F.A. 01).

3. *Statistical Division.*—British Meteorological and Magnetic Year Book, 1912 and 1913.

Parts I. and II.—Weekly and Monthly Issues up to date.
Appendix I.—3rd Quarter, 1913, sent to printer.
Part III., Section 1.—Monthly Issues up to date.
Section 2.—Monthly Issues for 1912 completed.
Part IV., Section 1 :—
Volume for 1912 completed with Introduction and Tables.
Section 2 :—
The Tables for 1912 have all been prepared and the Magnetic Tables sent to the printer. The notes on the instruments and on the records are also ready.

The examination of the Observatory records and of the sunshine cards returned to Observers, the tabulation of cup anemograms, and the summaries of pressure-tube anemograms have been kept up to date.

The sunshine cards from 30 stations which are filed in the Office have been examined for September. In all cases but one the observers' estimates were slightly above the Office measurements, the mean excess being abont 3 per cent.

The returns from 82 rainfall stations have been summarised to date preparatory to the publication of the monthly totals at the end of the year.

The Observers' Handbook, 1913 edition, has been signed for press.

Further progress has been made with the preparation of the new averages of rainfall, temperature and sunshine.

4 *Instruments Division.*—Marine work.—Six ships have received supplies from the Office. New thermometers have been sent to four sea temperature stations. Two new storm cones have been issued.

Telegraphic Stations.—Nine barometers graduated in inches and baromils have been issued. It is hoped that all telegraphic stations will be supplied with these instruments early in the new year. Thermometers have been sent to three stations.

Observatories and Anemograph Stations.—A new anemometer for recording direction as well as velocity has been sent to Eskdale Observatory. The instrument returned from that observatory is being fitted with direction-recording apparatus, and will be set up at Kew Observatory.

Ten requisitions from private individuals and corporations have been met. Eight consignments have been sent to the Colonies.

Administration.—Library :—

	October.
Authors' cards prepared for Catalogue	37
Cards prepared for Subject Catalogue	Nil.
Total number of Publications received...	798

The shelf marks of all books in Bay V. have been corrected in the catalogue and on the authors' and subject cards.

Inquiries :—	October.
Newspapers	5
Legal	7
Scientific and Commercial	78
Forecasts	1
General	5
	£ s. d.
Receipts in connection with Inquiries	3 3 8

Tables for the Admiralty for Mediterranean Pilot, Part 2, have been partially prepared for 10 stations.

M.O. Press.—During the month ended 31st October, 1913, the issue of the periodical publications has been as follows :—Daily Weather Report, maps for the Weekly Weather Report, maps for the Monthly Weather Report, Monthly Meteorological Charts of the North Atlantic, Monthly Meteorological Charts of the Indian Ocean, as contract.

On 1st October there was 1 requisition for forms outstanding. Since that date 3 requisitions have been issued and 1 discharged, leaving 3 requisitions still on hand.

Ninety additional copies of the Daily Weather Report have been printed during the period in compliance with requests received from Educational Authorities.

Publications.—Report for October, 1913, from Clerk of Publications :—

—	October.	
	Received.	Issued.
Daily Weather Report	875	871
Weekly Weather Report	375	328
Monthly Weather Report	575 (September)	469 (September)
Do. do. (Maps)	25 „	2 „
Daily Readings	75 (August)	52 (August)
Geophysical Journal, 1912	150 (December)	133 (December)
Hourly Values—Meteorological, 1912.—Kew ...	—	—
Eskdale ...	—	—
Valencia ...	—	—
Do. —Geophysical, 1911	—	—
Monthly Meteorological Charts (Atlantic)	600 monthly (to Nov. 3)	566
(Indian)	350 (December)	138 (Nov.) & 136 (Dec.)
International Upper Air Observations, 1911 ...	50 (September)	30 (September)
Eighth Annual Report...	—	5
Observers' Handbook (1911)	—	3
"Forecasting Weather"	—	—
Cloud Atlas	—	—
Report—Commission for Weather Telegraphy ...	—	1
Do. Commission for Maritime Meteorology ...	—	—
Codes of Signals	—	2
Calendar, 1913	—	5
Structure of the Atmosphere	—	—
Geophysical Memoirs, No. 1	—	5
No. 2	—	5
No. 3	—	6
No. 4	—	4

Receipts from sales at M.O.—October, 1913, 11*s.* 3*d.*

Investigation of the Upper Air (Mr. W. H. Dines's Report for the Quarter ended 30th September, 1913).—The work of the station has been carried on as usual during the quarter. Registering balloons were sent up on all the dates appointed by the International Committee and on two other occasions. Mr. Ryan had a large number of balloons in stock when he gave up his work at

Farnborough, and since these balloons were deteriorating they were sent to me for use. This explains the small expense incurred during the quarter. One of these balloons was of large size, and it had been obtained by Mr. Ryan for the purpose of reaching a great height. It was sent up from here on 29th July, which appeared and ultimately proved to be a safe day, and was only half expanded at the start so that it might reach a great height before bursting. Owing probably to the deterioration of the rubber incurred by keeping, it only reached the average height of 16 km. Several others of these balloons burst prematurely, two I think during filling, so that it has again been proved how necessary it is to use fresh balloons.

Observatories.—Kew (October, 1913).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	4
	Inclination	4
	Horizontal Force	4
Potential Gradient		on 17 days.
Wilson Apparatus		„ 9 „
Ebert Apparatus		„ 7 „

International cloud observations were made on 3 days.

The scale value of the Portable Electrometer No. 80 was determined at the National Physical Laboratory, and a scale value was also formed for the electrograph.

The magnetograph clock, which had been stopping several times, was cleaned by Adie ; it has behaved satisfactorily since.

The new wooden structure to contain the recording parts of the cup anemograph was fixed on the roof during 9th and 10th October ; this necessitated an interruption of the record for 31 hours.

The new gas governors were also fitted, entailing cutting off the gas supply for 3 hours. On very short notice lamps or candles were fitted to the thermograph, barograph and declination and horizontal force magnetographs and electrograph, and records were obtained.

Mr. E. H. Nichols has entered on his duties as Special Scientific Assistant. Mr. Stewart and Mr. Nichols between them have made substantial progress in overtaking the arrears of the magnetic and electrical tabulations.

A unifilar and a dip circle (with 4 needles) belonging to Lisbon Observatory, after repairs and alterations by Mr. Dover, have been tested and dispatched to Lisbon.

There have also been tested (under the present arrangements with the National Physical Laboratory) 14 theodolite compasses, 3 compass bowls with 6 cards and 1 azimuth mirror.

Photographic paper has been supplied to Eskdalemuir Observatory.

Eskdalemuir (May, 1913).—General.—The general work of the observatory has been maintained during the month and the records and tabulations continued as usual. An exception is the measurement of the curves from the barograph, which was interrupted from April 14, owing to the absence of the scales and microscopes of the tabulators, which were being regraduated into millibars instead of millimetres.

John Beck, Boy Clerk, took up duty on 5th May, and Mr. Parkinson, Clerk Computer, who had been at the Observatory since its inception, left on the 31st to take up an appointment in connection with the magnetic survey of the world, now being conducted by the Carnegie Institution of Washington. Under Dr. Bauer's orders he proceeded first to Falmouth.

The Superintendent was absent from the Observatory for 3 days on a visit to London to the Meteorological Office and Royal Society's Conversazione.

Seismology.—Mr. Dines has been engaged in a restandardisation of the Vertical Galitzin Pendulum. A clockwork mechanism was arranged to impart to the pendulum a definite periodic motion, and the effect of the variations in amplitude and speed studied by means of the photographic traces.

Wireless Telegraphy Installation.—The apparatus for reception of the Wireless Time Signals from Paris, mentioned in last month's report has been completed, and for the preliminary experiments was connected with an aërial consisting of two phosphor-bronze wires 18 inches apart, suspended between the top of the tower and a temporary mast erected on the roof of the magnet-house.

In absence of any near stations sending at known times, the preliminary difficulties in getting the apparatus into order were considerable, and quite of a different kind from that met with in London. The chief difficulty was to get into touch with any station rather than the tuning out of overlapping signals. The crystal detector used was the usual type of silicon-platinum, and the telephone a 2000-ohm double head-gear set of ordinary sensitiveness.

After a good deal of experimenting, mostly at night, the right capacity and inductance for the Paris signals was found, and the signals were received with but few failures whenever they were looked for.

A small systematic discrepancy was noticed between the time as recorded from Greenwich signal through the Post Office and that got from Paris.

The weather bulletins following the messages at 10.40 a.m. and 11.40 p.m. were read at times, and it was found possible to hear also the weather bulletins from Cleethorpes, the signals from Poldhu between 11.30 and 1.30 p.m., and also a certain number of 300 and 600 metre wavelength stations, the latter at night only.

Miscellaneous.—Owing to the absence of a doctor in Eskdalemuir being likely to be permanent, it was felt to be imperative to have some provision for first aid in case of accidents. An outfit of the usual appliances has been purchased for the Observatory.

Some considerable reorganisation of the workshop, and in particular of the arrangements for storage of materials used in constructional work, has been made during the month.

(June).—General.—The general work of the Observatory has been maintained during the month and the usual records and tabulations continued.

Mr. H. G. Harris, formerly of Kew Observatory, took up his appointment on the staff here on 2nd June, in place of Mr. Parkinson, who left on the 31st ult.

Mr. L. F. Richardson, Superintendent-elect, together with Mrs. Richardson, was at the Observatory from the 16th to the 25th, during which period he made a number of magnetic observations.

The Director of the Meteorological Office and Mrs. Shaw paid a week-end visit in connexion with the Garden Party alluded to later on.

The Superintendent went to London on the 12th, in order to read a paper at the Royal Astronomical Society on the 13th, entitled "On the Origin of Solar Electricity."

Seismology.—There have been several earthquakes during the month, one of the most notable being that of the 14th, the epicentre of which was in Bulgaria.

Magnetism.—The routine observations have been maintained, but owing to the departure of Mr. Parkinson and his place being filled by Mr. Harris, who has hitherto not had experience of magnetic work, a modification in the rota of absolute magnetic observations has had to be made.

The magnet of the magnetometer 60 A., the only one now used for some time in the absolute determinations, having lately shown signs of change, Mr. Dines has made during the month a number of extra observations amounting along with the ordinary ones to more than 20 in all, from which it is hoped a new value of M and also of the distribution constants P and Q can be calculated.

The dip-circle, whose behaviour during the past few months had become quite unsatisfactory, was taken to Kew by the Superintendent on the 12th, and after a number of comparisons of its indications with one of the Kew standard instruments had been made by Dr. Chree, it was sent to Mr. Dover for repair and readjustment.

Since April the Watson Balance has been working practically continuously in the West Room of the Magnet House. Its sensitiveness, although adjusted to the minimum possible, was however much greater than was desirable, being more than ten times as great as that of the Adie.

On one or two occasions during disturbances, which were not of unusual violence, parts of the trace were lost through this too great sensitiveness.

It was therefore decided, after consultation with Dr. Chree, to make the necessary alterations to the magnet-system to enable the sensitiveness to be reduced, and this has now been done and the instrument adjusted so that 1 cm. = approximately 30 γ, instead of 10 γ as formerly.

An approximate determination of its temperature-coefficient has been made in the West Hut, and the instrument has now been installed in the East Room of the Magnet House in place of the Adie, which has been removed to the West Room.

Meteorology.—Among the events of the month may be mentioned two very unusually severe gales, one lasting from the 7th to the 12th, and the other on the 29th, in both of which the velocity of the wind attained over 60 miles an hour.

Acetylene Plant.—It was found that the acetylene plant which was installed more then 5 years ago had never been subjected to an overhaul or clean, as is usual in such cases at intervals of two years or less. After consultation with Mr. Taylor, of the Engineering Department of H.M. Office of Works, he arranged for Messrs. Moyes & Sons, the makers of the plant, to clean and repaint the whole of the generators, gasholders and accessories. This work has been done, occupying about a fortnight. Although during the process there were one or two short periods when the proper pressure was not maintained, and on that account some of the traces slightly impaired, there was no loss of trace except on one occasion for about half an hour, when a cock was accidentally shut off by one of the workmen.

Garden Party.—On Midsummer Day, a Garden Party, to which the principal residents of the parish and outlying districts were invited, was held at the Observatory.

Miscellaneous.—The work on the drains of the Magnet House has proceeded during the month, and the large excavations on each side of the entrance porch and along the path are now filled. The trench round the north side remains still to be dealt with. (J.A.H.)

(August).—Dr. Harker kindly consented to stay on till the 8th August to finish off various matters and to give me the benefit of his experience in regard to numerous points that arose during this week.

I have relied on the staff to preserve the continuity of the routine work, and to advise me in relation to the same, and owe them many thanks for the way in which they have done both.

Mr. Dines has continued to look after the more mathematical part of the magnetics, but I intend to relieve him of this during the next month.

The magnetograph house is tolerably dry, that is to say, there is only quite a little water in the trench around the outer passage, and the rooms though clammy are not wet. The floor of the E. room was in many places white with mould. In order to prevent the germs being carried about, a mixture of creosote and phenol has been applied to the mould and to the places where people tread.

We have here, as you know, three magnetographs the property of Professor Watson, and lent by him to Dr. Harker. I have given Dr. Harker a receipt for them and therefore am at present personally responsible to Professor Watson for their care. One of them is the V instrument on which we now depend. The others, intended for recording H and D, are not in use.

Dr. Harker has presented to the Observatory an adjustable reading desk. He also lent me for the Observatory two thermopile generators for charging accumulators.

The motor car has been driven several times to Lockerbie and is in working order.

The shortage of water has occupied a good deal of time and attention. With care and economy we have managed to make the supply suffice, and now with rainy weather coming on I anticipate that there will be ample.

A Clerk of the Works (Mr. Blair) from H.M. Office of Works, has been over recently to inspect the system and some inexpensive improvements are mooted.

The West Hut has been cleared of magnetic material.

A statement of holidays and accounts up to and including 26th August is sent herewith.

Received from J. A. Harker, F.R.S. :—

1 Watson Vertical Force instrument with drum and clock.

1 Declinometer (mirror carrier lacking) } These two have no clocks or drums.
1 Horizontal Force Variometer }

Received on loan from Dr. J. A. Harker two thermopile generators with gas burners complete.

(L.F.R.)

(September).—Staff.—On 30th Mr. Gendle left and Mr. Skelton arrived. Mr. Skelton is taking over the meteorological work and Mr. Harris is training as a magnetic observer. John Beck is doing the photography. Report of holidays herewith.

Grounds and Buildings.—The underground magnet house is in much the same state as at the end of August. A white mould (like jam mould) is growing in places in both rooms. In the E room the creosote and phenol have checked it, but it shows signs of returning. Mr. Stonier will mop up the water in the trench around the underground passage once a week. It has been observed for some time that the southerly of the two wood beams supporting the ceiling of the E underground room is bent. I have not noticed any change and I think there is no cause to worry about it, but take this opportunity to put on record a measurement by which its motion (if any) can be investigated ; vertical distance from underside of wood beam to top of N.E. corner of clock-pillar 190·7 centims. on 3rd October, 1913. The shortage of water continued for the first part of the month, and the drains have been stopped. The roofs of the W hut and the summer house have been tarred.

Magnetics.—Absolute observations have been taken as usual and the N, W, and V recorders appear to be in good order. The curves have been read in millimeters up to the following dates :— N, middle of June ; W, end of September.

It will probably be possible to standardise the curves of the Watson V instrument from 1st August onwards. So far they have not been read.

The scale values may be in need of extensive revision, I cannot yet tell for certain.

Mr. Walker's practice in regard to base values is inapplicable to this year because he assumed freedom from discontinuities. Some other process will have to be decided upon before we can give final values for the components.

Meteorology.—The following recording instruments are running :—

Mercury dry thermograph.
Mercury wet thermograph.
Pen thermograph in underground.*
Mercury barograph in underground.
Pen aneroid barograph.*
Beckley rain gauge.
Dines anemometer.
Campbell-Stokes sunshine recorder.

The curves of those marked with a * are not tabulated. The other tabulations are up to date. Grass has been substituted for gravel under the small Stevenson screen, but no readings are taken of the thermometers in the screen.

Part of the Dines twin pen instrument has arrived.

Seismology.—The following instruments are running :—

Galitzin, 3 components.
Milne, 2 components.
Omori, 1 component.

The Wiechert has been discontinued. The Galitzins ought to be restandardised, but time for this work has not yet been found. The tabulations of the Galitzins are up to 31st December last. The Milne records were tabulated up to the end of March and sent to Shide. We are ignorant of the precise meaning to be attached to the microseismic data already published in the 1912 Geophysical Journal.

Letters have been sent to Prince Galitzin and the International Bureau at Strassburg, inquiring as to the meaning of the microseismic data in their respective publications.

The motor car is in working order—

Mileage during August and September, Official, 194·2.
" " " " Superintendent's personal, 270·7.

(October).—Staff.—Mr. Dines began his leave on 30th, Mr. Laidlaw was away for one day, I have been away for 3½ days. Leave book is sent herewith.

Grounds and Buildings.—The water supply is now abundant. The underground chamber is if anything a little drier. The water removed from the trench is being measured. The floor of the W room is being coated with a mixture of creasote and boiled linseed oil with two objects, that of killing the mould and that of fastening down the highly poisonous dust of mercuric chloride with which the floor is covered.

Mr. Laidlaw, on his own initiative, has dug a large number of pits up the west side of the enclosure so that the frost may get in and break up the soil ready for the young trees in Spring.

Magnetics.—The instruments are in good order. Absolute observations have been made weekly as usual. The computing of the N and V components is in about the same stage as it was a month ago. Mr. Dines has the reading of the W component up to date. I am just beginning to estimate the magnetic character for the days of 1913.

Before the method of scale testing was revised the brass cases of the magnetographs were prevented from slipping about on the marble by melted wax being run round them. The wax has a susceptibility less than that of $FeSO_4 7H_2O$. Next a comparison of azimuths was made in the underground. Assuming that the azimuth of the line which Mr. Walker caused to be cut on the floor is x minutes west of north then the azimuth of the line determined by Dr. Chree in the West Room is $x-20'$ west of north. As Mr. Walker's line was determined from the sun and a star and Dr. Chree's from the declination, this result suggests that there is 20′ difference of declination between the E hut and the W underground chamber. Further the azimuths of the deflection

bar used in the scale tests were found to be 1½ degrees in error. They have been set right and marks have been fixed to the lath and plaster in the E room by which they can be checked at any time. Lath and plaster is not a suitable support for a mark, but the alternative was to drill the stone and this would have disturbed the magnetographs.

An arrangement has been made so that the Adie deflection bar can be fitted to the Watson V.F. instrument, thus making double-ended scale tests possible.

Nine scale tests, each involving four positions, have been made on each magnetograph, the test magnet being "broadside on," and since the receipt of Dr. Chree's criticism nine more tests "end on." The formula for P has been obtained for each position and the moment of the test magnet redetermined.

Meteorology.—The instruments specified last month are running. The new Dines recorder is still behaving satisfactorily. Mr. Skelton keeps the tabulations well up to date.

Seismology.—The Galitzins, Milne and Omori are running. The Milne tabulations up to September have been sent to Shide and the Galitzin tabulations for January to you.

Atmospheric Electricity.—The electrograph is in order, and I believe Mr. Dines has the tabulations up to date.

Library.—After Mr. Parkinson left this had fallen somewhat into disorder. Mr. Skelton has taken it in hand and effected a marked improvement.

Filing Correspondence.—Mr. Harris is proceeding with this and has got as far as 1st August.

Motor.—Advantage has been taken of the break-down to inspect the gear box and differential. Breakages have been discovered therein—things broken in such a way that the car would still run, so that they were not obvious. The total bill for replacing broken parts will be nearer £10 than £5. Mr. Dines has been superintending operations and teaching Mr. Stonier.

Accounts.—*Mr. J. S. Dines's visit to Foreign Aerological Stations.*—Reported—that authority had been given to Mr. J. S. Dines to visit the aerological stations at Berlin, Lindenberg, Hamburg, Strassburg, Munich Aachen, Rostock and Potsdam, in company with Mr. Gordon Dobson, who represented the Central Flying School, Upavon. The visit extended from 12th September to 19th September, and Mr. Dines has drawn up a report (M.O. 4498/13).

Payment of Mr. Dines's travelling expenses, amounting to £30, was authorised.

Annuity Investment.—Reported—The investment on 23rd October of the sum of £541 in the purchase of £777 11*s.* 6*d.* in the stock of the 2½ per cent. Annuities.

The amount of this stock now held for the purchase of Annuities for retiring members of the staff of the Meteorological Office is £1,380 5*s.* 11*d.*

Submitted—The following statement of the Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on 30th September, 1913	1,695	18	4
Receipts from 1st to 31st October, 1913	6,267	18	7
	7,963	16	11
Cheques drawn from 1st to 31st October, 1913...	3,010	18	8
Balance on 31st October, 1913	£4,952	18	3

FIFTY-THIRD MEETING.

South Kensington, S.W., 28th January, 1914.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW. | CAPT. LYONS.
CAPT. HARVEY. | MR. MIDDLETON.

DR. SCHUSTER.

440. The Minutes (429–439) of the last Meeting (26th November, 1913) were read and confirmed.

441. CORRESPONDENCE.—**Banking Account** (Minute 430).—Reported—the following reply from the Treasury :—

24,789/13.

Treasury Chambers,
14th January, 1914.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letter of the 13th ultimo (C. 06) suggesting that, owing to the distance of the Meteorological Office from Burlington Gardens, it would be desirable to transfer the banking account of the Meteorological Office from the Western Branch of the Bank of England to the Brompton Square Branch of the London County and Westminster Bank.

In reply I am to request you to inform the Meteorological Committee that My Lords have ascertained that the Bank of England are prepared, if so requested by the Meteorological Office, to make arrangements for the monthly wages cheques of their staff to be cashed at the Brompton Square branch of the London County and Westminster Bank. They learn also that the credits to the account consist almost exclusively, if not entirely, of cheques and postal orders ; and they understand that, after special crossing in favour of the Meteorological Committee, these documents might be sent by registered post to the Western Branch of the Bank of England without appreciable risk or inconvenience.

In these circumstances the Meteorological Committee will doubtless agree that a transfer of the banking account is not necessary.

I am, &c.,
T. L. HEATH.

W. N. Shaw, Esq., LL.D., F.R.S., &c., &c.,
Meteolorogical Office.

Submitted—draft of letter as follows :—

SIR,

30th January, 1914.

I AM instructed by the Meteorological Committee to acknowledge the receipt of your letter of the 14th January, 1914, No. 24789/13, in reply to theirs of the 13th December, 1913, respecting their banking account.

Representatives of the Bank of England have visited the Office on several occasions to obtain more detailed information of its requirements.

Authority given to the London County and Westminster Bank at Brompton Square will largely obviate the risk of loss that is now run, and a similar authority given to the Richmond Branch, which the Bank of England is also willing to arrange, will enable the Kew staff to be paid by cheque instead of by cash as at present.

The payment by registered letter addressed to the Bank of the sums collected at the Office is less satisfactory than paying them in at Brompton Square. A messenger from the Office passes both Banks on his daily rounds, so that the Office already has facilities for paying in, and the cost of a daily registered letter is a consideration, apart from the formalities of registration and verification. A Bank in the immediate neighbourhood of the Office is also convenient for the officials who have to work the account, apart from the question of paying in.

The provision suggested in your letter does not entirely meet all the points which the Committee had in view in suggesting the transfer of the account to a local bank within easy reach of the Office, but the Committee do not wish to pursue the matter further, and they concur in the arrangements which their Lordships have been good enough to suggest.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
London, S.W.

Approved.

Anglo-American Exposition.—Reported—the following letter :—

Anglo-American Exposition,
Shepherd's Bush, London,
8th January, 1914.

DEAR SIR,

THE Executive Committee of the Anglo-American Exposition, which is now amalgamated with a powerful and influential Committee with Earl Grey as President, which has been formed for the purpose of celebrating the one hundred years of Peace between the two English-speaking nations, are extremely desirous that representative exhibits should be obtained from every Department connected with His Majesty's Government, and have already received promises of large contributions from several Departments, including the Home Office.

The Anglo-American Exposition is not in any sense a commercial speculation, and all profits will be devoted to public objects.

In asking the Meteorological Office to make a representative display, we would suggest that it should send objects of a similar nature to those which were forwarded on previous occasions to the Science Section of the Franco-British and Japan-British Exhibition, and this selection, if possible, should be brought up to date.

The Executive Committee are well aware of the length of time it would require to prepare an exhibit of the Meteorological Office, and we would, therefore, ask that this application should receive early attention.

We are,
Yours faithfully,
TECK.
BLYTH.
ROTHERHAM.
W. MATHER.
KINTORE.

The Director of the Meteorological Office,
South Kensington, S.W.

It was agreed to express regret that in view of the time and cost necessary to prepare a satisfactory exhibit, the Committee are unable to promise their co-operation this year.

Miss Anderson (Minute 431).—Reported—that Miss Anderson had declined to accept the offer of £25 per annum in lieu of the capital sum of £200, and that accordingly the £200 had been paid on 31st December, being the gratuity on retirement, in consideration of efficient service previous to 31st March, 1909.

Post Office. Revised Account for Postage.—Read—the following letter (5515/13) :—

5090 Exp.

General Post Office, London,
1st December, 1913.

SIR,

I AM directed to inform you in connection with the Quarterly payment of accounts for Official Postage that owing to a failure of record the Meteorological Office has not been charged with the full amount due for Postage for the period from October, 1910, to 26th July, 1913—34 months. The undercharge is estimated at £2 per month, and I am to request that you will be so good as to forward a cheque for the amount underpaid, viz., £68.

The cheque should be made payable to "The Postmaster-General or bearer" and crossed "Bank of England for account of H.M. Postmaster-General."

I am, &c.,
F. J. PEARSON,
Comptroller and Accountant-General.

The Director
Meteorological Office.

After discussion, it was agreed to adjourn the further consideration of the letter to the next meeting.

National Health Insurance.—Reported—Treasury letter 21237/13 of 10th December, 1913, covering Report of Departmental Committee on the Insurance Act with reference to the Employees under Section 47 of the National Insurance Act, 1911.

442. ESTIMATES FOR 1914–1915 (Minute 434).—The following letter, which had been circulated for approval and despatched on 15th December, 1913, was ordered to be printed on the Minutes :—

15th December, 1913.

SIR,

WITH reference to your letter of the 9th October, 1913, No. 19950/13, I am desired by the Meteorological Committee to forward the enclosed copy of their Estimate of the expenses of the Meteorological Office for the year ending 31st March, 1915, showing charges against the Grant amounting to £20,000.

I am to call attention to three points.

1. *Forecasts, &c. by telephone.*—After their plans for 1914–15 had been formulated, the Committee received notice from the Controller of the London Telephone Service to the effect that an additional exchange line was necessary in order to deal with the Office service ; and in considering the matter the Committee decided that the time had now come for provision to be made for supplying weather

information to the public (reports of present weather, forecasts, and storm warnings) in reply to inquiries by telephone.

The Committee have hitherto made no provision for this service because they foresaw it would involve them in a considerable expense which ought not to be a charge upon Office funds, and they had no guarantee that the amount was recoverable.

They have learned from the experience of an accidental error in the Telephone Directory that unless they are protected by suitable machinery, the mere announcement of an Office number in the Directory would be the occasion for an unlimited service of replies to inquiries from hotel porters and others. At the same time they are agreed that the information ought to be available to the public by telephone, and they have decided to make the experiment.

The service requires the organisation of an efficient telephone office on the premises, with unfailing attendance from 8 a.m. till 9 p.m., and the Committee estimate the cost of maintaining the service (including the Postmaster-General's rental for the line) at £100 per annum. They have accordingly included £100 in the Estimate for 1914–15 for this purpose, and they have given provisional approval to a scheme for supplying the information to those who have a deposit with the Postmaster-General or at the Office. Additional lines could be maintained at less than proportional cost.

It is, however, doubtful if they can recover the whole £100 by payments collected from the general public. They have thought it necessary that the service should be "popular," and they regard 3*d.* as the largest minimum charge for a forecast on that basis. It is felt that to charge 6*d.* might restrict the service to the wealthier classes.

The Committee think it better to face the risk of loss than to let the experiment fail by making a charge that will not commend itself to the public, but they are placed in a position of some difficulty in finding funds to meet it. They have decided to increase the percentage hitherto charged upon the supply of instruments to observers and Colonial Governments, which for certain reasons has been carried on for some years at a loss, and they have increased the Estimate of the Appropriations in Aid accordingly.

2. *Storm Warnings by Telegraph.*—The second point is in regard to the Storm Warning Service. In the endeavour to find means for meeting the possible loss above referred to, the Committee have considered again the conditions under which Storm Warnings are now supplied. The Committee cannot see that there is any ground, except tradition, for drawing a distinction in respect of payment between sending Warnings by telegraph and supplying forecasts and other information by telephone. Yet in the one case *the whole of the cost of telegraphy falls on Office funds*, but in the other we hope to recoup ourselves for a large part, at least, of the expense, and if possible to recover the whole.

The matter calls for consideration at the present time, because a revised system of signals has been approved by the International Committee, and has already been adopted by France and Germany. In connexion therewith the Committee had under consideration a memorandum, of which a copy is enclosed.

The general principle upon which this Office is worked is that the whole of the information collected in it is at the disposal of any member of the public who will come and fetch it, but that if if he wants it *delivered* he ought to pay for its delivery.

On that principle, I am to ask you to submit to Their Lordships the suggestion that the responsibility for the decision as to the ports to be supplied with Storm Warnings, and the cost of transmitting the Warning Messages, ought properly to be borne by the Departments of Trade and Fisheries which look after the special interests of sailors and fishermen, and not by this Office, the responsibilities of which are toward every section of the community alike. It will be within the recollection of Their Lordships that an application to the Development Commission for a grant to this Office for the distribution of forecasts in the interests of agriculturists and fishermen was refused on that ground. The Committee feel that if they are debarred from claiming special consideration for services to special sections of the community, they ought not to be called upon to defray the charges for such special services. If the Meteorological Office were relieved of this expense of delivering Storm Warnings the funds thus set free could with great advantage be devoted to developing other methods of distributing information or extending the area reached by the information which the Office collects.

3. *Arrears of Charges for Telegrams.*—After Their Lordships' decision with regard to the cost of the telegraph service at the new Office, a letter was received from the Post Office (copy enclosed*) stating that the Postmaster-General proposed to charge for arrears amounting to £242 7*s.* 10*d.* In reply the Committee represented that they had no provision in their Estimate of expenses for 1913–14 under this head beyond the sum of £100 for the current year, and have received a second letter stating that the Postmaster-General will raise no objection to payment of this account being deferred until the beginning of the next financial year, or, if preferred, to the sum due being recorded, as an exceptional arrangement, against "Scientific Investigations, &c.," provided that the Meteorological Office obtain Treasury authority for the adoption of the latter course.

The Committee have been unable to include any sum in the Estimate for 1914–15 to meet this charge, and they beg leave to ask that Their Lordships will sanction the amount being recorded against "Scientific Investigations, &c." as the Postmaster-General suggests.

I am, &c.,
W. N. Shaw.

The Secretary of
H.M. Treasury,
London, S.W.

443. Office and Observatory Staff.—**Regulations for Appointments.**—Submitted—draft of revised edition of Circular 002, embodying the changes authorised by Minute 431.

Approved.

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* Printed in Minute 432.

Also—a draft of regulations with regard to the communication of information for copyright publication and the patenting and registration of instruments and designs.

Age of Retirement.—Read—a memorandum from Captain Hepworth asking that he may be retained as Marine Superintendent for a year or more after attaining the age of 65 (27th April, 1914) in order that the work which has already commenced under his superintendence may be completed.

It was resolved—that the Committee place on record their appreciation of the excellent services rendered by Commander Hepworth to the Office and to Marine Meteorology since appointment as Marine Superintendent, which dates from 2nd October, 1899. They are prepared to approve a pension at the rate of one-sixtieth of his present salary for each year of service up to the date of his retirement.

The Committee are of opinion that it is not desirable in the interests of the Office for the tenure of appointments to be prolonged much beyond the age of 65 years, and they do not therefore contemplate the continuance of Captain Hepworth's tenure beyond the 31st March, 1916, in any case. It is agreed to continue his appointment until 31st March, 1915, with a view to further continuance until 1916 if his health is satisfactory. The Committee are prepared to consider the appointment of a Professional Assistant to act as Assistant Superintendent as from 1st April, 1915.

Kew Appointments.—Reported—a letter from F. Levin, forwarded by Dr. Chree, asking for confirmation of his suggestion that from the end of the current financial year under the new regulations he would become a staff clerk.

It was agreed that the Committee are not yet in a position to specify the arrangements of the staff for the financial year 1914–15.

Also—correspondence with Dr. Chree respecting the wages of L. G. Hemens, who, originally employed as Civil Service boy clerk, had entered the Competition for probationers and boy clerks, and had been appointed Probationer for service at Kew (Minute 421) ; but being below the age limit had, from the date of his appointment, been paid at the boy clerk's rate, that being the only wages for that age which are within the regulations.

It was resolved—that the Committee are not prepared to fix a scale of wage for probationers below the age of 17 ; they will take the special circumstances of Mr. Hemens's case into account upon his reaching the age of qualification for probationers, and consider specially the payment of fees for evening classes.

Eskdale.—Reported—correspondence with the Superintendent of Eskdale Observatory respecting the terms of employment of R. Laidlaw, handyman, and the payment of a gratuity of £2 at the end of December, 1913.

Superannuation.—It was agreed to authorise the purchase of an annuity of £150 per annum for Mr. J. A. Curtis on his retirement from the position of Chief Clerk and Cashier on 1st April, 1914. The payment out of the sum allocated in the Estimates for 1914–1915 for Superannuation of the balance required to supplement the £1,380 5*s.* 11*d.*, $2\frac{1}{2}$ per Cent. Annuities, belonging to the Committee for the purchase of the annuity, was authorised.

Reported—that information (390/X.04) had been received of the death of Mr. G. G. Francis, formerly a second class clerk in the forecast division, to whom a pension out of current account of £76 3*s.* 2*d.* had been granted by authority of Minute 82.

444. Observatories.—**Kew.**—*Library.*—The Director reported that, after an examination with a working bookbinder, he had estimated that the binding necessary to make the library effective might be represented by 6,000 volumes, which would cost about £1,000 at bookbinders' ordinary prices ; that he had prepared a letter asking the sons of the late Mr. Warren De la Rue, F.R.S., to take up the matter in view of the centenary of Mr. De la Rue's birth in 1915 and his interest in the Observatory while it was in the hands of the British Association and the Royal Society, and that he was still seeking for a favourable opportunity to bring the letter to Messrs. De la Rue's notice.

Reported further—that it was proposed to ask Miss Powell to take in hand the sorting and arranging of the unbound books, with the assistance of Miss Corrin, daughter of the caretaker, who would be employed for the usual office hours at 14*s.* a week, provided for by the surplus of the payment from the Antarctic funds in consideration of Dr. Chree's services over the salary payable to Mr. E. H. Nichols under Minute 421.

Fire Appliances.—Read—letter 5814/13 from the Office of Works reporting that fire appliances, at a cost of £43, were necessary. Reported—that upon search twelve serviceable fire buckets had been discovered together with a hand pump, which, however, was past repair.

It was agreed to authorise the expenditure that, upon inquiry, was found necessary for the provision of satisfactory fire appliances.

Grounds and Fencing.—Submitted—a plan prepared by the Office of Works for the enclosure of the space on the north, east, and south of the Observatory in order to protect the immediate neighbourhood of the Observatory from the horses pastured by the Mid-Surrey Golf Club in the paddock.

Reported also—an interview with the Director of the Royal Gardens, Kew, and the Assistant Curator, Mr. Bean, with a view to obtaining their assistance in planting the grounds in the immediate neighbourhood of the Observatory mound with shrubs, and of providing facilities for observation of the vertical gradient of atmospheric potential, &c., over growing plants. In view of the estimates for 1914–1915, and the accounts for the three quarters to 31st December, 1913, the Chairman offered to provide for the fencing and planting at his own expense.

It was agreed that the order be given for a fence of split chestnut with wire lacing as recommended by Mr. Pitcher of the Office of Works, if no objection is taken at the Observatory on account of the wire, and that the question of the Chairman's offer stand over for further consideration.

Eskdale.—*Proposed Cottages* (Minute 426).—Read—the following letter from the Treasury :—

21323/13.

Treasury Chambers,
31st December, 1913.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letter of the 23rd October last relative to the accommodation at the Magnetic Observatory, Eskdalemuir.

My Lords understand from the Office of Works that the erection of a pair of cottages, as proposed, would cost about £1,100 owing to the remoteness of the site and the absence of facilities generally. In these circumstances they would not feel justified in sanctioning the erection of two cottages as proposed ; and as they consider that the question of accommodation should be settled definitely before any addition is made to the resident staff, they are unable at present to sanction the appointment of another workman for the execution of small repairs, &c.

My Lords understand that a cottage to accommodate the mechanic and family and a workman (if a single man) could be built for about £600, but even this reduced expenditure is high, and they desire me to enquire whether some alternative scheme could not be adopted which would obviate altogether the necessity for a new house. I am to request that you will be good enough to reconsider the matter accordingly, and I am to enquire in particular whether accommodation could not be obtained for both the mechanic and the workman, if they were single men, in Davington or elsewhere without building.

I am also to enquire what has been the annual expenditure on repairs, &c., in recent years, and what saving is likely to be effected by the appointment of a resident workman.

I am, &c.,
T. L. HEATH.

The Director,
Meteorological Office.

The following reply was approved :—

2nd February, 1914.

SIR,

I AM instructed by the Meteorological Committee to express their thanks for your letter of the 31st December, 21323/13, with reference to the proposed cottages at the Magnetic Observatory at Eskdalemuir.

The Committee have learned with regret that the cost of the proposed cottages works out at so high a figure as £1,100.

Before putting forward their application the Committee caused most careful inquiry to be made as to the possibility of finding accommodation of any kind in Davington without building. For reasons which Their Lordships will appreciate, they would have preferred that alternative had it been possible. The result of the inquiry was, in effect, that there is no accommodation to be had. The conditions at Davington are indeed somewhat irregular. The school-house, not being required for the time being by the schoolmistress, has been occupied now for some years by one of the Observatory officials at the nominal rent of £5 a year. Meanwhile a cottage occupied for many years by the man who looks after the roads has become uninhabitable. The owner is unable to effect the necessary repairs, and the occupier, unable to find any other accommodation, has gone to live at Langholm, which is 16 miles away.

The Committee understand that there is a good deal of overcrowding, and they have reason to think that the very high cost of building is to a considerable extent due to the difficulty of finding temporary accommodation for workmen.

In the course of the inquiries the Superintendent of the Observatory suggested that the landowners would probably be willing to provide the necessary accommodation if the Observatory would guarantee an economic return for the outlay, and the project of approaching the Laird of Davington with that object in view was mooted. It is from that project that the present application arises. The project would mean—

(1) an "economic" interest on the money probably to a third party ;
(2) a margin for the landowner with no risk ; and
(3) a consideration for the use of the land.

It became obvious that if the Office of Works undertook the building, part of (1) and the whole of (2) and (3) would be saved. The Committee had no reason to suppose that the Laird of Davington would, for the purposes of fixing an economic rent from a Government Institution, estimate the cost of building at a lower figure than the Office of Works. The experience of the "road man" suggests that the cost of any necessary repairs would, in practice, fall upon the tenant, and therefore all the advantages are on the side of the proposal put forward by the Committee, as compared with asking the local landowner to build.

With reference to the last paragraph of your letter, the Committee are only responsible for internal repairs, and the building has not yet been long enough in occupation for these to have become regular. The responsibility for external repairs falls upon the Office of Works, and the cost of these is not reported to the Committee. Such costs as have been charged hitherto against the Committee as "recoverable," are items for alterations to accommodate new instruments, and these do not afford a criterion for estimating the annual saving likely to be effected by a resident workman. The workman in question was to be in the employ of the Office of Works for external repairs,—roofs, drains, walls, gutters, &c., though he would also be available for internal repairs on "recoverable" order. The Committee will willingly ask the Office of Works for an estimate of the saving likely to be effected, but Their Lordships would probably prefer to obtain the information direct. The Committee would, however, like to represent that in an exposed situation like Eskdalemuir the advantages of a "stitch in time" in the matter of repairs are unusually obvious, and a resident workman is the embodiment of that principle.

In this connexion the Committee may remark that they have in their employ a handy-man who looks after most of the matters connected with the buildings for which the Committee are responsible. His orders are to devote any time that he can spare to bringing the ten acres of rough land into order, and planting it with trees for protection. He himself rightly lays stress on the importance of this work, about which he has more practical knowledge than anyone else on the establishment. It seems absurd on "punctilio" to send to Edinburgh for a man to do such a job as tarring a roof or clearing a drain for which the Office of Works is responsible, but it is understood that in the past the Observatory has been very scrupulous in observing the distinction. It would therefore in many ways be convenient to the Committee for the Office of Works to have a workman on the spot, and the Committee understood that it would be likely to prove economical for the Office of Works.

The sort of man who is likely to settle down with advantage in a place of that kind is, as a rule, married, so that to have only one cottage for a mechanic, his family, and a workman would make a less satisfactory job of it. It would, however, be of substantial advantage to the Observatory to have that accommodation, and they hope Their Lordships will sanction its provision.

Since the letter of the 23rd October was written, it has transpired that the existence of a telephone at the Observatory has led to the people of Davington and neighbourhood using the Observatory practically as a local telegraph office, and thus saving themselves 3½ miles journey to the nearest post office. Sooner or later such a practice, though it cannot in the circumstances be refused, will give rise to difficulty. It has been understood for a long time that the Postmaster-General is willing to grant a better postal delivery to Davington (letters are now delivered by the postman after he has collected the outgoing mail ; they therefore cannot be answered on the same day), but no one in Davington will accept the responsibility of attendance. The Committee suggest that the Post Office might be willing to co-operate with the Observatory, and arrange for the working of a Post Office and Telegraph Office from the gate cottage. It would be useful for the Observatory, and an obvious advantage to the neighbours over a wide area. It would put the present irregular practice into order.

Subject to Their Lordships' approval, it might be desirable to keep the question as between one cottage and two cottages open until this point has been considered by the various authorities concerned.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
London, S.W.

Offer of Hartmanor.—Reported—correspondence with Mr. J. Milne Home, Chamberlain of the Duke of Buccleuch about the offer on lease to the observatory of Hartmanor, near Eskdalemuir Church, which was formerly occupied by a doctor, but was no longer required for that purpose by the local authorities as the Langholm doctor was within call by means of the Observatory telephone and could reach Eskdalemuir, if necessary, within an hour. Dr. Harker had requested the offer of the house when the local authorities had made up their minds about the establishment of the local doctor.

It was agreed that as the house is 4¼ miles from the Observatory the Committee could not entertain holding the lease for the purpose of an official residence.

445. PRESENTATION OF PUBLICATIONS.—**University of California.**—In view of the importance of its library, it was agreed that the University of California be placed on the list for presentation copies of the publications of the Office.

446. METEOROLOGICAL OFFICE, EDINBURGH.—Reported—the following :—

COMMITTEE FOR THE METEOROLOGICAL OFFICE, EDINBURGH.

Minutes of Meeting held in the rooms of the Scottish Meteorological Society, 122, George Street, Edinburgh, on Monday, 1st December, 1913, at 2 p.m.

There were present :—

Dr. W. N. Shaw, in the chair ;
Mr. J. Mackay Bernard ;
Mr. R. B. Greig ;
Professor Sampson ;
Dr. E. M. Wedderburn ; and
Mr. A. Watt, Secretary.

An apology for absence was received from Mr. J. Patten Macdougall, C.B.

Minutes.—The Minutes of Meeting held on 19th June, 1913, were read and approved.

Form of Reports for 1914.—It was agreed that the Weekly, Monthly, and Quarterly Reports to the Registrar-General for Scotland be continued in their present form, but that a note be inserted in the Quarterly Reports calling attention to the fact that the observations of pressure are not reduced to Standard Gravity. Dr. Shaw indicated certain changes proposed for the Monthly and Weekly Reports issued from the Meteorological Office, London. Provision was to be made in the Monthly Report for fuller representation of Scotland.

Form of Schedules.—It had been agreed that the Offices in London and Edinburgh should use the same form of Schedules, and it was agreed that Forms 347 and 348, copies of which were laid on the table, should be adopted for collecting observations from observers.

Office Staff.—The Secretary reported that the staff at present consisted of himself, Miss M. Crawford, who had come to the Office in January, 1913, and Miss W. Hume who had come in October, replacing Miss Cameron who had been absent during the summer and had resigned on account of ill health.

Form of Accounts.—It was agreed that a Statement should be drawn up signed by the Society's Treasurer regarding the expenditure for the financial year ending 31st March, 1914. The Secretary was instructed to prepare a Statement for consideration.

Fees for Inquiries.—It was remitted to the Chairman and the Secretary to prepare a Statement of Fees payable by solicitors and others for enquiries and the giving of evidence in Scottish Courts of Law, the Regulations to follow those in force at the Meteorological Office with such modifications as might be necessary.

Phenology.—Mr. Greig reported that the Board of Agriculture proposed, commencing in 1914, to collect from its crop reporters exact information regarding the date of sowing, the date of beginning of harvest, and the date of end of harvest of five of the principal crops. It was agreed that a comprehensive phenological survey could best be made by securing the assistance of the Royal Scottish Arboricultural Society and the Horticultural Society, and Mr. Greig undertook to suggest to those Societies that they should co-operate with the Board of Agriculture in collecting information.

Dr. Shaw intimated that Mr. Greig had been nominated to represent the Board of Agriculture for Scotland on the Commission Internationale de Météorologie Agricole which had been constituted at the request of the International Institute of Agriculture by the International Meteorological Committee at its meeting at Rome last year.

447. DIRECTORS' REPORT AND ACCOUNTS :—

Meteorological Office, Edinburgh.—Reported—a visit to Edinburgh for the purpose of attending a meeting of the Committee of the Meteorological Office, Edinburgh, on 1st December.

Lectures.—Reported also—an address at the request of the Council of the Royal Society of Edinburgh before this Society on the afternoon of 1st December, with the title of "Principia Atmospherica." The address dealt with the laws or axioms of atmospheric motions and certain postulates and propositions, some of which had been previously treated in a paper published in the journal of the Scottish Meteorological Society. The paper is to be printed in the Society's proceedings. An address on the same subject was given before the Mathematical Association in the afternoon of 7th January, and the notes of that address have been privately printed at the Cambridge University Press.

On the same evening a paper on "Wind Gusts and the Structure of Atmospheric Disturbances" was given at the United Service Institution, at the request of the Aeronautical Society of Great Britain, before a joint meeting of the Aeronautical Society and the Royal Meteorological Society.

Meteorological Conference, Edinburgh.—During the visit to Edinburgh opportunity was taken to ascertain the feeling of Meteorologists in Edinburgh as to a proposal for a Conference in September of students and observers in Meteorology and allied subjects, in the absence of the British Association in Australia. The matter was taken up very warmly, and in consequence a committee was formed to meet at the Office on 12th January, at which Dr. E. M. Wedderburn was present as the representative of the Scottish Meteorological Society. It was decided to proceed with the organisation of the Conference and Mr. F. J. W. Whipple was appointed Honorary Secretary.

Units.—In view of the decision reported to the Treasury in the Eighth Annual Report to introduce the use of millibars in place of inches in the Daily Weather Report on 1st May, 1914, a draft memorandum is submitted for consideration intimating the change.

International Meteorology.—Prolonged correspondence has taken place with the Meteorological Institutes of Europe respecting the changes in the International code for telegraphic reporting, approved by the International Meteorological Committee for 1st May, 1914. The Deutche Seewarte has made additional proposals direct to the various institutes, and the correspondence has in consequence been general. Meanwhile after very long delay France has accepted the proposed changes for only three of their stations and Russia for only one. It appears, therefore, that there will be a separate code for the Countries of Central Europe, but no great inconvenience is anticipated.

Visits to Office.—Reported—that applications from schools, clubs and other bodies for permission to visit the Office in order to see the exhibits, instruments, forecast room, &c., had been received in increasing numbers, and that arrangements had been made for the parties to come as a rule on Saturday afternoons, when members of the staff volunteered to assist in conducting them round the Office. During the present winter ten such parties had been arranged. The number of members in in each party usually ranged from 30 to 40.

Reports of Work (November and December, 1913).—0. *Administrative Division.*—Library, Réseau Mondial & Technical Inquiries :—

Library :—	Nov.	Dec.
Authors' cards prepared for Catalogue	57	57
Total number of Publications received	736	837

Alteration of shelf mark of books in catalogue proceeded with.
Book plates placed in 1,000 volumes. 125 volumes prepared for binding.

Inquiries :—	Nov.	Dec.
Newspapers	5	12
Legal	7	7
Scientific and Commercial	76	68
Forecasts	1	1
General	0	4
	£ s. d.	£ s. d.
Receipts in connexion with Inquiries	3 1 5	11 6 2

78 MS returns received in November and 137 in December from Foreign and Colonial Stations.
Tables prepared for the Admiralty Mediterranean Pilot, Vol. 2, and Arctic Pilot, Vol. 3.

M. O. Press.—During the two months ended 31st December, 1913, the issue of the periodical publications has been as follows : Daily Weather Report, maps for the Weekly Weather Report, maps for the Monthly Weather Report, Monthly Meteorological Charts of the North Atlantic, Monthly Meteorological Charts of the Indian Ocean, as contract.

On 1st November there were three requisitions for forms outstanding. Since that date four requisitions have been issued and two discharged, leaving five still on hand, including one for 25 Plates for the Seaman's Handbook.

Eighty additional copies of the Daily Weather Report have been printed during the period in compliance with requests received from Educational Authorities.

Publications.—Report for November and December, 1913, from Clerk of Publications :—

—	November.		December.	
	Received.	Issued.	Received.	Issued.
Daily Weather Report ...	900	885	875	856
Weekly Weather Report ...	375	335	375	336
Monthly Weather Report, &c.	575 (October)	470 (October)	575 (November)	479 (November)
Do. do. (Maps)	25 (October)	2 (October)	25 (November)	2
Daily Readings	75 (September)	54 (September)	75 (October).	55 (October)
Geophysical Journal, 1912 ...	—	—	—	—
Hourly Values — Meteorological :—Kew	—	—	—	—
Eskdale	—	—	—	—
Valencia ...	—	—	—	—
Hourly Values—Geophysical	—	—	—	—
Monthly Meteorological Charts (Atlantic).	600 monthly (to Dec. 3)	487	600 monthly to January (2)	520
Monthly Meteorological Charts (Indian).	—	—	350 (January)	293
International Upper Air Observations, 1911.	—	—	50 (Oct., Nov. and Dec.).	30 (Oct., Nov. and Dec.).
Eighth Annual Report ...	—	—	—	—
Observer's Handbook (1913)	—	—	200	96
"Forecasting Weather" ...	—	2	—	—
Cloud Atlas	—	—	—	2
Report — Commission for Weather Telegraphy.	—	—	—	—
Report — Commission for Maritime Meteorology.	—	—	—	—
Codes of Signals, 1913 ...	—	—	—	1
Calendar, 1914	—	—	500	225
Structure of the Atmosphere.	—	1	—	—
Geophysical Memoirs, No. 1	—	—	—	2
No. 2	—	2	—	6
No. 3	—	—	—	3
No. 4	—	—	—	2
No. 5	—	—	600 (& 350)	(350)

Receipts from sales at M.O.—November 1913, 17*s.* 0*d.*, December 1913, £3 0*s.* 6*d.*

New publications.—200 copies of the 1913 edition of the Observer's Handbook, and 500 copies of the Calendar for 1914 were received, and were being issued at the end of December. 500 official copies, 100 sale copies, and 350 extra copies for the Deutsche Meteorologische Gesellschaft (Minute 388) of Mr. Gold's prize essay (Geophysical Memoirs No. 5) were received. The copies for the German Meteorological Society have been despatched to Professor Hellmann at Berlin. The cost of printing and paper for these copies, £15 14*s.* 6*d.*, has been claimed on behalf of the Stationery Office from the Society.

The following occasional publications are still in the press :—

Seaman's Handbook of Meteorology, Rome Report, Geophysical Memoirs Nos. 6 and 7 ; also Circulars 001.

Geophysical Memoirs Nos. 8, 9 and 10 are nearly ready for despatch to the printer.

1. *Marine Division.*—Examined 49 new Meteorological Logs, and 1 Abbreviated Log.

Monthly Meteorological Charts of the North Atlantic and Mediterranean.—Issues for December and January published. Chart for February sent to Lithographer. Drawing inset charts for weekly issues. Charting Sea and Air Temperatures for September, October, November, December, and January. Registering and acknowledging observations, issuing charts, and renewing supply of forms. Received 240 North Atlantic registers, Form 121 ; and 147 Radio-telegraphy registers, Form 138.

Monthly Meteorological Charts of the Indian Ocean.—Issues for January and February, 1914, published ; and issue for March in course of preparation. Received 29 reports of Indian Ocean Weather, Form 122.

Wireless Telegrams from Ships.—Preparing weekly list of sailings. Extracting and tabulating marine observations, also preparing each week a sea temperature chart of the North Atlantic. Obtaining corrections for 69 barometers. Acknowledging reports and issuing copies of instructions and observation forms.

Reports of Ice sent to " Shipping Gazette "—27.

Monthly Meteorological Charts of Davis Strait and Baffin Bay.—Drawing wind roses, isobars, and isotherms. Summing and meaning weather.

Observational Duties.—Time occupied 55 hours.

Extraction of Observations relative to Selected Areas for the Dutch Meteorological Institute.—176 hours. For the Indian Government.—6 hours.

Indexing of Data in Ocean 10° Squares.—The collating and charting of Monthly Salinity and surface temperature observations in the North Atlantic initiated in connexion with investigations being carried out by the Fishery Branch of the Board of Agriculture and Fisheries.

2. *Forecast Division.*—(1) Current Work has been kept up to date.

(2) Number of wireless messages has been :—

	Nov.	Dec.
From H.M. Ships	1	7
From Ships of Mercantile Marine...	556	429

(3) Inquiries :—

	Nov.	Dec.
Prepaid Reply Telegrams	29	10
Other Telegraphic Inquiries	3	6
Wireless Inquiries	—	1
Telephone Inquiries	10	12
Personal Inquiries	3	0

(4) Corrections to Daily Weather Report issued up to November.

(5) Checking of 8 p.m. Forecasts completed up to April 24, 1913.

(6) Working Charts completed for binder to September 27th.

(7) Arrangements have been completed for the issue in a new form of the Daily Weather Report from January 1st.

(8) Arrangements have been made with the Post Office for the issue of telegrams to Aviation stations as a " classified service " similar to that in use for the issue of Storm Warning Telegrams.

3. *Statistical Division.*—British Meteorological and Magnetic Year Book, 1912–1913.

Parts I. and II. Weekly and Monthly Issues up to date.
Appendix I.—3rd Quarter, 1913, issued.

Part III. (1).—Monthly issues up to date.
(2).—January 1913 sent to printer. Preparation of Annual Summary for 1912 in hand.

Part IV. (1).—Volume for 1912 issued.
January 1913 prepared for printer.
(2).—Tables for 1912 in press.

The examination of the Observatory records and of the Sunshine Cards returned to Observers, the tabulation of cup anemograms, and the summaries of pressure tube anemograms have been kept up to date.

The sunshine cards from 30 stations which are filed in the Office have been examined for October.

The returns from 81 rainfall stations have been summarised to date preparatory to the publication of the monthly totals at the end of the year.

The Observer's Handbook, 1913 Edition, has been issued.

The necessary preparation for the tabulation in millibars of photographic barograms from Aberdeen from January 1st 1914, has been made.

The new Monthly Forms for Climatological Reports, prepared in connexion with the Edinburgh Office, have been issued to the Climatological Stations in Scotland with a letter explaining the new arrangements.

4. *Instruments Division.*—The stock at the following dockyards has been brought up to the establishment :—Sheerness, Devonport, Chatham, Pembroke, Portsmouth, Haulbowline, Hong Kong, Bombay and Bermuda. Instruments have been supplied to thirteen ships direct from the Office, and the stock of thermometers in the hands of the Glasgow agent has been replenished. New sea-water thermometers have been sent to six sea-temperature stations. A storm-warning cone has gone to Swansea. Various supplies have been sent to six telegraphic stations.

The instruments issued to Eskdale Observatory include an Earth Inductor for the measurement of magnetic dip. This instrument has been supplied by Herr Schulze, of Potsdam ; a certificate for it has been given by the Magnetic Observatory at Potsdam. The Inductor is to be used with a Broca Galvanometer made by the Cambridge Scientific Instrument Company. Two barometers with millibar graduation have also gone to Eskdale, as well as a supply of pilot balloons.

A hygrograph, a stop-watch and a Fineman nephoscope have gone to Falmouth in addition to a set of four frames for exhibiting weather reports there. A Fortin barometer with millibar scale and absolute maximum and minimum thermometers have been issued to Kew.

The new instruments taken into use at the Office include "wireless" receiving apparatus, a "Mercedes-Euklid" calculating machine, and a soot-gauge, made according to the specification of the Committee for the Investigation of Atmospheric Pollution.

Instruments have been supplied on repayment to seventeen private observers or local authorities, the complete outfit for a new station going to Malvern. The branch meteorological office at South Farnborough has taken a set of instruments which are being purchased by the Aircraft Factory.

Nine colonial orders have been completed, eleven were in hand at the end of the year.

During December the Superintendent of the Instruments Division spent a week at Eskdale Observatory. A separate report on this visit has been presented to the Director.

Observatories.—Kew (November).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	4	
	Inclination	4	
	Horizontal Force	4	
Potential Gradient on		14	days
Wilson Apparatus on		13	„
Ebert Apparatus on		18	„

International cloud observations were made on five days.

The following magnetic instruments have been tested :—

1 Unifilar Magnetometer.
2 Dip Circles.
1 Liquid Compass.
1 Theodolite Compass (re-examined after rejection).

Four Solar maximum thermometers in vacuo (2 black and 2 bright bulbs) have been tested and reported on to the National Physical Laboratory.

Considerable progress has been made in overtaking arrears for the Geophysical Journal. The tables for April and May have been completed and sent to the Office.

Photographic paper has been supplied to Eskdalemuir and Valencia Observatories.

The books which were stowed away in boxes in the packing shed during the building operations have been brought in, unpacked and put on the shelves—so far as space allowed—but no attempt to arrange them has yet been possible except in the case of some of the bound volumes.

(December).—The barograph, thermograph and anemograph (Robinson Cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	6	
	Inclination	5	
	Horizontal Force	5	
Potential Gradient on		15	days
Wilson Apparatus on		8	„
Ebert Apparatus on		11	„

International cloud observations were made on 3 days.

The following magnetic instruments have been tested :—

1 Unifilar Magnetometer.
1 Dip Circle with 4 needles.
1 Prismatic Compass.

Photographic paper has been supplied to Eskdalemuir Observatory.

The builders have concluded their operations and the staff has now been moved into the main building.

The Dent and Skelton clocks, the Newman Standard barometer, and the Float barograph have been transferred from the old "Clinical House" to their new positions in the main building. A new inch-millibar barometer, a Benndorf electrograph and a Callendar recording thermograph were brought from the Office and erected by Mr. James.

The final tables for the Geophysical Journal have been completed and sent to the Office.

The South room in the old "Clinical House" after being vacated by the staff was put at the disposal of Mr. Foster, who has commenced measuring the Antarctic magnetic curves.

The Superintendent was away on holiday from the afternoon of 5th December to 8th December. Mr. E. Boxall was also away for two and a half days on holiday. Mr. Nichols began his Christmas holiday on the 22nd and Mr. Stewart on the 24th.

Eskdale (November).—Holidays.—Mr. Dines was away until 15th. On his return the Superintendent was away for part of a week, leaving Mr. Dines in charge. The leave book is sent herewith.

Grounds and Buildings.—The underground is in much the same state. Mr. Stonier keeps the trench dry; the quantities of water he has removed run as follows :—

October 24th	815 c.c.
November 12th	320 „
November 19th	60 „
November 26th	52 „

The bent wood beam mentioned in September report has not moved (measurement to-day 190·8). A white mould still grows freely on untreated wood, and even in places on the creosoted parts.

Mr. Laidlaw has cleaned the gutters and cesspools outside the gate, which is, properly, the duty of H.M. Office of Works.

Magnetics.—The instruments are in order. Absolute observations have been made weekly by Mr. Dines or the Superintendent. Mr. Harris is practising on an instrument lent by Dr. Chree for the purpose, and is learning to reduce absolute observations.

We are complying with the new rule that magnetic curves are to be read twice, and they have begun again from 1st January.

The data are practically ready for the G. J. for the first three months of this year. A detailed reconsideration of base values up to June, 1913, is nearly over.

Mr. Dines has devised a short method of calculating P and Q which reduces the time to a small fraction of what it used to be. Lest anyone reading this should have doubts that the results so obtained might not be accurate, I should explain that P and Q are checked by seeing that they reduce the values of $\frac{m'}{H'}$ at the three distances to one and the same value of $\frac{m}{H}$.

Mr. Skelton has found time to do a considerable amount of magnetic computing in addition to the bulk of the meteorology.

Scale values of Magnetograph traces for 1913 (and 1912).—The following have been adopted for January, 1913, to November, 1913 :—

	N.	8·70.
	W.	8·80.
(Watson)	V.	4·09.

For further particulars see correspondence (CE 80, MO 4370, 5274).

The values which were used for 1912 will be found on the computing forms now at the Office.

Meteorology.—The instruments specified in the October report are running and the tabulations up to date.

Seismology.—The Galitzins, Milne and Omori are in order. The Galitzin records are tabulated up to February, those of the Milne instrument to October.

Atmospheric Electricity.—The electrograph is in order and Mr. Dines is busy with the October tabulations.

Motor Car.—This is waiting for a certain bevel wheel. Mr. Dines and Mr. Stonier have put in a great deal of work (and some overtime) in overhauling it generally.

Supply of Information to the Public.—*Re* Peruvian earthquake to J. E. Crombie, Esq., LL.D., Parkhill House, Dyce, Aberdeenshire.

J. Beck does all the typing and the photography (under Mr. Harris) and is learning to read curves and do simple computing.

(December).—Staff.—Mr. Harris left on 9th and Mr. Lupton arrived on the same day. The reverse journeys have been arranged to take place exactly four weeks later. I have assured Mr. Harris that his six days' leave in January will count as part of his 1913 holiday, as he took it then, instead of in December, in order to fit with other observatory arrangements.

Official Visitors.—Mr. Whipple was here for a week and Mr. Baker for a couple of days.

Grounds and Buildings.—The underground continues in much the same state. More pits for trees have been prepared by Mr. Laidlaw.

Magnetics.—The instruments are in order. A new electro-magnetic dip-inductor by Schulze (Potsdam) has been received. Absolute observations have been made as usual.

The tabulation is in the following backward state :—

P and Q determined up to July.

Base values assigned up to the end of March.

N read once to July, twice to February, converted to γ to February. Monthly sheets January and February.

W read once to November, twice to July, converted to γ up to April.

V read once to November.

The magnetic characters of days up to end of September will be posted to De Bilt to-day.

A little rust having appeared on our Collimator magnet, it is now kept in a desiccator over solid NaOH. Mr. Whipple and the Superintendent began to set up the Schulze Inductor.

Meteorology.—Mr. Baker set up and started the float barograph. We are now going to determine its scale value.

Messrs. Dines and Stonier are installing the new anemometer mast.

Mr. Skelton has the ordinary tabulations up to date. He is making a balloon observation at about 13h. on most days, with the assistance of Mr. Lupton. It is intended to send you the results weekly.

Seismology.—The Galitzin's and Milne's are in order. The Omori clock has gone wrong. The Galitzin tabulations are finished up to the end of March and the Milne to the end of September.

Atmospheric Electricity.—The electrograph is in order and the curves read up to the end of November. Further tabulation has also been done, but unfortunately this will now have to go to the melting pot.

Motor Car.—This is running as smoothly as it did when handed over to the Observatory. Mr. Dines has improved the arrangement for changing gear. It is now (as it was at the beginning of August) the noisiest car in the neighbourhood.

Information supplied other than to M.O.—*re* Instrumental disturbances to Col. J. C. Campbell. Magnetic character of days to De Bilt.

Wireless Apparatus.—This is in order. Mr. Lupton and the Superintendent are continuing the calibration begun by Dr. Harker.

Branch Office (November).—A discussion has been prepared dealing with the vertical motion of the air as revealed by the series of pilot balloon ascents made at Pyrton Hill during the past three years.

Mr. Dines has checked one month's forecasts for Mr. Dobson of the Central Flying School, Upavon.

Mr. Billett has collected information on the South Wales tornado of October 27, with a view to the preparation of a complete discussion of this phenomenon.

Mr. Wise has kept the regular analysis work on anemograms up to date, and completed copying out the Aberdeen sunshine figures for the 30-year period 1881–1910. He has also continued the work on gradient and surface winds.

(December).—During the month work has been transferred from Pyrton Hill to the new Meteorological Office in the grounds of the Royal Aircraft Factory at South Farnborough. Instruments are now being supplied for the equipment.

Five pilot balloon ascents followed by a single theodolite have been made at Farnborough during the month.

Most of the calculation necessary for a detailed discussion of the relation between the gradient and surface winds at Southport has been finished.

Mr. Billett has completed his report on the South Wales tornado of October 27th, 1913.

It is proposed to commence the daily preparation of the 6 p.m. map at Farnborough from January 1st, 1914.

Storage accommodation for one theodolite has been arranged in the Golf Course Anemometer Hut, so that it is hoped to commence a series of two theodolite pilot balloon ascents with the new year.

It is also hoped that the thermometer enclosure may shortly be ready for the installation of the instruments.

Accounts.—Submitted—The following statement of the Bank account in the cash book :—

	£	*s.*	*d.*
Bank balance on 31st October, 1913	4,952	18	3
Receipts from 31st Oct. to 31st Dec. 1913	942	0	1
	5,894	18	4
Cheques drawn from 31st Oct. to 31st Dec. 1913	5,593	0	1
Bank balance on 31st December, 1913	£301	18	3

Submitted—The following Statement of Accounts for the Nine Months ending 31st December, 1913 :—

RECEIPTS.					PAYMENTS.			
1912. £ s. d.		£ s. d.	1913. £ s. d.		1912. £ s. d.		£ s. d.	1913. £ s. d.
404 6 4	Balance from year 1912-13	—	95 17 9		750 0 0	Director	—	750 0 0
12,750 0 0	Parliamentary vote.	—	15,000 0 0					
	OBSERVATORIES:					OFFICE SALARIES (including Insurance):		
791 4 3	Kew	404 16 1			5,735 11 4	Monthly	6,121 8 11	
1,148 19 5	Eskdalemuir ...	1,300 6 1			632 10 10	Weekly	735 9 10	
59 5 5	Valencia	30 15 5						6,856 18 9
400 0 0	Farnborough ...	250 0 0				M.O. OBSERVATORIES:		
87 3 3	Sale of Forms, &c.	81 18 5			1,237 2 7	Kew	1,398 9 8	
			2,067 16 0		1,065 5 1	Eskdalemuir	1,375 4 2	
	DEPARTMENTAL EXPENSES REPAID:				403 7 11	Valencia	437 14 11	
135 10 4	Forecasts, &c. ...	124 18 9			262 9 11	Farnborough ...	358 9 9	
	Marine, Statistics, and Observa-							3,569 18 6
76 7 8	tories	83 5 4				OFFICE EXPENSES:		
53 10 6	Instruments ...	38 19 5			524 16 1	Rent, Fuel, &c. ...	516 17 1	
			247 3 6		255 9 5	Furniture, Fittings, &c.	295 9 2	
	INCIDENTAL EXPENSES REPAID:				265 14 6	Incidental Expenses	316 16 10	
297 8 0	Forecasts, &c ...	330 11 3						1,129 3 1
55 15 8	Other Branches ...	74 17 1				POSTAGE:		
	Stationery Office				228 3 7	General	214 19 9	
33 8 7	Account ...	40 9 9			270 19 11	Daily Weather Report	305 4 6	
			445 18 1					520 4 3
	TELEGRAPH CHARGES REPAID:				1,509 18 1	TELEGRAMS, &c. ...	—	1,772 15 7
171 6 8	Home	317 7 2				TRAVELLING EXPENSES		
	Telegrams sent				304 18 4	Inspections, &c. ...	—	400 17 5
340 13 4	abroad	403 14 4						
			721 1 6			SUPERANNUATION:		
					1,039 7 0	Funded Annuities	621 19 0	
	INSTRUMENTS:					Non-funded Annuities and Fund ...	1,010 4 9	
7 10 0	Royal Navy ...	2 2 6						1,632 3 9
	Mercantile Marine,					COST OF INSTRUMENTS:		
2,085 5 11	Stations, &c. ...	1,610 5 7			428 6 5	Royal Navy	759 6 6	
			1,612 8 1			Mercantile Marine,		
156 12 5	INSPECTIONS ...	—	182 13 0		2,269 5 4	Stations, &c. ...	1,675 18 5	
								2,435 4 11
	SUPERANNUATION ACCOUNT:					AUXILIARY OBSERVATORIES, &c.		
536 5 0	Annuities	589 4 6			1,612 1 9		—	1,775 14 8
	Interest on Investments	20 15 6						
39 14 6						LECTURES AND EXPERIMENTS		
	Income Tax Re-				262 10 0		—	68 13 4
8 15 0	turned	—						
			610 0 0			BALANCE:		
	LECTURES AND EXPERIMENTS ...	—	85 12 6		636 5 7	Cash at Bank ...	301 18 3	
160 0 4	Furniture, Fittings,				63 18 11	,, at Office ...	41 9 5	
—	&c.	—	183 11 6					343 7 8
£19,799 2 7			£21,255 1 11		£19,799 2 7			£21,255 1 11

LIABILITIES			ASSETS.		
£ s. d.		£ s. d.	£ s. d.		£ s. d.
2,011 18 10	To sundry creditors	2,712 17 4	700 4 6	By cash at Bank and at Office ...	343 7 8
16 2 3	,, salaries reserved	17 7 3	496 6 9	,, Admiralty	832 4 0
396 14 10	,, balance	117 19 8	—	,, superannuation	135 5 0
			568 11 7	,, M.O. instruments in stock ...	478 17 9
			659 13 1	,, sundry debtors	1,058 9 10
£2,424 15 11		£2,848 4 3	£2,424 15 11		£2,848 4 3

NOTE.—On 31st December the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £1,380 5*s.* 11*d.*

Observatories.—Statement of Accounts for the Nine months ended 31st December, 1913 :—

KEW.

1912. Receipts.				1913.		
£	s.	d.		£	s.	d.
447	13	0	Gassiot Trust	212	7	2
281	5	0	National Physical Laboratory ...	98	15	8
—			Scott Antarctic Fund	40	0	0
5	0	0	Grazing Rents	5	0	0
57	6	3	Miscellaneous	48	13	3
445	18	4	To Balance	993	13	7
£1,237	2	7		£1,398	9	8

1912. Payments.				1913.		
£	s.	d.		£	s.	d.
			Salaries :—			
506	10	10	Superintendent	506	10	10
312	16	2	Assistants	415	3	10
72	1	4	Caretaker	74	5	5
11	6	1	Sundays and holidays	12	8	1
73	14	3	Overtime	51	17	0
64	4	8	Rent, fuel, and lighting	64	5	1
17	19	7	Repairs, furniture, &c.	146	15	11
7	2	9	Insurance	9	19	0
46	4	10	Materials	23	16	3
81	19	8	Instruments	20	5	4
1	8	0	Books, printing, and stationery ...	2	1	6
41	14	5	Incidental expenses...	71	1	5
£1,237	2	7		£1,398	9	8

ESKDALE.

£	s.	d.		£	s.	d.
1,000	0	0	Royal Society (Parliamentary Grant)	1,000	0	0
108	6	8	Salary of Assistant in Seismology	297	12	1
40	12	9	Miscellaneous	2	14	0
—			To Balance	74	18	1
£1,148	19	5		£1,375	4	2

£	s.	d		£	s.	d.	£	s.	d.
			Salaries :—						
300	0	0	Superintendent ...				286	1	7
367	3	0	Assistants				337	1	8
78	18	4	Mechanic and Caretaker				94	18	9
38	19	3	Handyman				41	9	9
—			Head Servant				13	16	3
7	6	0	Books, stationery, &c. ...				5	1	6
5	19	8	Insurance				14	8	4
16	7	4	Travelling expenses ...				86	16	9
			Incidental expenses :—						
28	15	0	Rental of private wire	1	15	0			
17	18	0	Instruments and repairs	64	10	2			
51	2	3	Photographic paper ...	52	0	11			
55	17	2	Coals and carriage of coals, light	96	13	6			
61	14	4	Repairs, furniture, &c.	120	11	6			
35	4	9	Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	49	18	6			
—			Purchase of motor car ...	110	0	0			
							495	9	7
83	14	4	Balance				—		
£1,148	19	5					£1,375	4	2

VALENCIA.

£	s.	d.		£	s.	d.
41	15	5	Royal Society (magnetic observations)	13	5	5
17	10	0	Grazing Rent	17	10	0
344	2	6	To Balance	406	19	6
£403	7	11		£437	14	11

£	s.	d.		£	s.	d.
			Salaries :—			
206	5	0	Superintendent	206	5	0
90	16	3	Assistants	91	14	5
36	0	0	Magnetic observations	24	0	0
10	15	4	Rent, rates, and taxes	5	4	8
—			Repairs, &c.	50	0	0
13	5	0	Private wire	13	5	0
46	6	4	Miscellaneous expenses	47	5	10
£403	7	11		£437	14	11

FARNBOROUGH.

£	s.	d.		£	s.	d.
400	0	0	Advisory Committee	250	0	0
—			To Balance	109	1	6
£400	0	0		£359	1	6

£	s.	d.		£	s.	d.
			Salaries :—			
163	15	0	Meteorologist	187	10	0
—			Professional Assistant	69	8	1
93	14	11	Other Expenses (including laboratory assistant)	102	3	5
137	10	1	By Balance	—		
£400	0	0		£359	1	6

FIFTY-FOURTH MEETING.

South Kensington, S.W., 25th March, 1914.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

THE HYDROGRAPHER.	MR. MIDDLETON.
CAPTAIN LYONS.	DR. SCHUSTER.

448. The Minutes (440–447) of the last Meeting (28th January, 1914) were read and confirmed.

449. CORRESPONDENCE.—**Foreign Office.**—Read—the following request from the French Ambassador, transmitted through the Foreign Office and the Board of Agriculture :—

Ambassade de France, à Londres,
le 30 Janvier, 1914.

L'Ambassadeur de France serait reconnaissant à Son Excellence le Secrétaire d'Etat des Affaires Etrangères s'Il voulait bien lui faire connaître les textes legislatifs et administratifs qui règlementent les services de météorologie générale et plus particulièrement de météorologie agricole en Grande Bretagne. Il lui serait également obligé de lui indiquer les rapports qui ont pu être faits sur cette question.

Monsieur Paul Cambon saisit cette occasion, &c.

It was agreed to quote as "textes administratifs" the Treasury Minutes of 20th May, 1905, and 31st March, 1910, constituting the Meteorological Committee, and to forward copies to the Foreign Office with a letter explaining that the only "textes legislatifs" of the Office are the Annual Finance Acts of Parliament, voting the Annual Grants-in-Aid of the Meteorological Office.

Board of Trade.—*Ghent Exhibition* (Minutes 399,410).—Reported—the receipt of the following letter (474/C. 03) from the Exhibitions Branch of the Board of Trade :—

Board of Trade (Exhibitions Branch),
Queen Anne's Chambers, Westminster, S.W.,
29th January, 1914.

SIR,

NOW that the Ghent International Exhibition is closed and the work of returning the British exhibits to this country has been completed, I desire to take this opportunity of expressing to you the thanks of this Department for the assistance which was given by the Meteorological Office in the organisation of the exhibit relating to the progress of Aeronautical Science which formed part of the British Section at the Exhibition in question.

The instruments and diagrams which the Meteorological Office was kind enough to place at the disposal of the Department added considerably to the interest of the exhibit, which attracted great attention among visitors to the Exhibition.

It is hoped that it may be found possible at a future exhibition to demonstrate even more fully the developments in regard to aeronautics which are taking place in this country, and I trust that when such an occasion arises this Department may be permitted to have recourse once more to the kind assistance of the Meteorological Office.

I may add that a copy of the catalogue issued in connection with the official exhibits is being forwarded to you under separate cover.

I am, &c.
U. F. WINTOUR.

The Director,
Meteorological Office,
Exhibition Road,
South Kensington, S.W.

Board of Agriculture and Fisheries.—*Hydrographic Sections across the Atlantic.*—Reported—the following letter (662/102) from the Board of Agriculture and Fisheries, communicating a resolution of the International Council for the Exploration of the Sea

on the subject of suggested hydrographic sections across the Atlantic to be made by vessels crossing the Atlantic on the occasion of the opening of the Panama Canal :—

Board of Agriculture and Fisheries,
4, Whitehall Place, London, S.W.
No. A. 1494/1914. 9th February, 1914.

SIR,

I AM directed by the Board of Agriculture and Fisheries to inform you that the International Council for the exploration of the sea at their meeting at Copenhagen in September last passed a resolution requesting the Bureau to communicate through the usual diplomatic channels to the countries participating in the international investigations the following resolution with regard to transatlantic hydrographical sections, and also to bring the resolution to the notice of the Governments of Austria, France, Italy, Portugal, and Spain, as well as to his Serene Highness Prince Albert of Monaco.

"It is very desirable that those nations which propose to send vessels across the North "Atlantic Ocean on the occasion of the opening of the Panama Canal should at the same time "give opportunity for the obtaining of modern hydrographical sections during the passage."

Having regard to the importance of the hydrographical observations from the point of view of meteorology and the opportunities which would be afforded for the carrying out of meteorological observations, the Board would be glad to learn whether the Meteorological Committee would be disposed to support them in the endeavour to secure the services of one of His Majesty's ships for the purposes of the observations in question.

In that event I am to suggest that the Committee should at once communicate their views to the Foreign Office and the Admiralty.

I am, &c.,
SYDNEY OLIVIER.

The Director,
Meteorological Office,
South Kensington, S.W.

Reported further—that a copy of the letter, with the following draft letter to the Foreign Office and Admiralty, had been circulated to the Committee on 12th February and approved by members of the Committee with the exception of the Hydrographer who intimated (M.O. 771) that it was improbable that suitable vessels would be commissioned by the Admiralty for the purpose of the proposed investigation. The letter in support of the application of the Board of Agriculture and Fisheries was forwarded to the Foreign Office and Admiralty on 20th February :—

SIR, 20th February, 1914.

THE Meteorological Committee have been informed that the International Council for the exploration of the sea have passed a resolution with reference to the observations of the Atlantic by vessels crossing that ocean on the occasion of the opening of the Panama Canal. The resolution is worded as follows :—

"It is very desirable that those nations which propose to send vessels across the North "Atlantic Ocean on the occasion of the opening of the Panama Canal should at the same time "give opportunity for the obtaining of modern hydrographical sections during the passage."

It is understood that the resolution is to be brought to the notice of His Majesty's Government as well as those of other countries through the usual diplomatic channels.

Having regard to the inter-relation between the meteorological conditions of the atmosphere and the oceanographical conditions of the water beneath it, the Meteorological Committee beg leave to ask for the favourable consideration of the proposal conveyed by the resolution, and at the same time to suggest that the hydrographical observations may be supplemented by meteorological observations appropriate to the investigations.

In support of this suggestion the Committee ask leave to put forward the following considerations.

Since 1854, the Meteorological Office has been engaged in the collection of observations from ocean-going ships. The investigation began when nearly all were sailers, and the first problem to be dealt with was the very extensive one of representing the average conditions of current, wind, weather, pressure, temperature of the air and sea, and its surface density.

The material for the preliminary survey of all the frequented ocean routes is now practically complete, and it is now time to take up the problems which are represented by "differences from the normal." This new departure implies reliance to a greater extent than formerly upon the accuracy of the individual observations, and meanwhile that accuracy is to some extent impaired by the use of steam in place of sails.

The Meteorological Office has no surveying vessels of its own, and for any refinement or extension of the process of observation it has to rely upon the co-operation of H.M. Navy and of the Mercantile Marine. It therefore loses no opportunity that may present itself for obtaining observations of special character. Such an opportunity could not fail to be afforded by the special provision proposed for obtaining hydrographical sections during the passages to Panama and back.

The Meteorological Committee therefore welcome the proposal that special provision should be made as suggested, and hope to be allowed to avail themselves of any opportunity thereby afforded for meteorological observations of a special character.

The Committee would be specially gratified if the opportunity could be extended to include observations of the upper air. Such observations have been made on the ocean from ships of the German, Italian, and Danish and Russian navies, on the Victoria Nyanza by an expedition sent out by

the German Government, and also over the ocean by the private yachts of the Prince of Monaco, and the late M. Teisserenc de Bort. The Lords of the Admiralty were good enough to lend a vessel for coastal work with kites in 1907, but the only successful attempt by British investigation on the high seas was in connexion with the "Scotia" expedition of last year. The investigation has very direct bearings upon the discrimination of atmospheric conditions for aeronautical purposes, and so far as the science is concerned it is right to say that as with the meteorology of the surface, so with that of the upper air, it is to the investigation of the air over the ocean that we must look for guidance in the formulation of the most general principles.

I am, &c.,
W. N. SHAW.

Reported—the following letter (1008/102) from the Admiralty :—

Admiralty,
SIR, 4th March, 1914.

WITH reference to your letter of the 20th ultimo, No. 662 (102), on the subject of certain observations being undertaken by vessels sent across the North Atlantic Ocean on the occasion of the opening of the Panama Canal, I am commanded by my Lords Commissioners of the Admiralty to acquaint you, for the information of the Meteorological Committee, that it is improbable that British vessels suitable for the purpose will be sent across the Atlantic on this occasion.

I am, &c.
W. GRAHAM GREENE.

The Director,
Meteorological Office,
South Kensington, S.W.

Post Office.—*Revised account for postage.*—Consideration of the letter printed in Minute 441, which was adjourned to the present meeting, was again adjourned.

International Association for Seismology.—Reported—the receipt of an invitation (926/P. 17) from Prince Boris Galitzine, president of the Permanent Commission for Seismology, to the meeting of the fifth Conference of the Commission and the third General Assembly of the International Association for Seismology to be held in St. Petersburg on a date at the beginning of September 1914, not yet fixed.

Napier Tercentenary Celebration, 1914.—Reported—the receipt of an invitation to the office from the Royal Society of Edinburgh to become Founder Member of the Celebration.

450. ESTIMATES FOR 1914–15 (Minute 442).—**Telephones.**—Reported—the following reply from the Treasury, which had been circulated to the Committee, together with a memorandum by the Director setting out reasons why the minimum charge for a telephonic forecast should be fixed at 3*d.* instead of 6*d.* as recommended by the Treasury :—

24,831/13.

Treasury Chambers,
SIR, 6th February, 1914.

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letter of the 15th December last and its enclosures relative to the expenditure of the Meteorological Office for 1914–15.

In reply I am directed to state that, in accordance with the undertaking given in Treasury Letter 24668/12 of the 25th February last, My Lords will ask Parliament to vote a grant of £20,000 in aid of the expenses of the Meteorological Office in that year.

As regards the supply of forecasts by telephone My Lords raise no objection to the proposed service, but They are of opinion that the charge for it should, in the first instance at all events, be fixed at 6*d.* per forecast, with a view to making it more nearly self-supporting. They doubt whether for a service of this character the lower charge of 3*d.* would materially increase the demand, and it is evident that, if the charge were originally fixed at 3*d.*, it would be very difficult to raise it afterwards.

As regards storm warnings by telegraph, My Lords are not prepared to assent to the suggestion that the cost of transmission should be transferred to the Vote for the Board of Trade or the Board of Agriculture and Fisheries, but They see no objection to the suggestion that those Departments should be consulted as to the claims of new localities to be added to the list of places to which the warnings are sent. My Lords see no reason why, in the case of future applicants at least, it should not be arranged that the cost of transmitting the telegrams should be defrayed by the locality.

With reference to the question of arrears of charges for telegrams, My Lords have decided that no charge shall be made to the funds of the Meteorological Office in respect of the period prior to 31st March, 1913. Payment of the sum of £100 per annum will therefore be required as from 1st April, 1913, only.

I am, &c.,
JOHN BRADBURY.

It was agreed that, as the reasons in favour of the adoption of the lower scale were not set out in the Committee's letter of 15th December, 1913, they should be incorporated

in a reply to the Treasury asking that the question of the fee should be reconsidered and sanction given to the adoption of the lower scale.

Storm Warning Stations.—It was agreed that the number of Storm Warning Stations to which warnings are sent by telegram at the office expense be fixed at 200, and that the list of such stations be reduced to that number as opportunity offers. Should an application for storm warnings be received from a new locality, it was agreed that the station be added to the list of storm warning stations, provided that the local authority is willing to pay the cost of the telegrams in the event of there being 200 stations on the free list already.

Regulations for Appointments (Minute 443).—A draft of regulations with regard to the communication of information for copyright publication, and the patenting and registration of instruments and designs marked D.450 was amended and approved for introduction as occasion may require at the discretion of the Director.

Sanction was given to suggestions put forward by Mr. Lempfert at the request of the Director for authorising forecasts and reports issued in M.S. or type, or by telegraph.

451. Office Staff.—**Salary list for 1914–15.**—Various increments in accordance with a salary list for 1914–15, marked D451, submitted by the Director, including increases of £7 10*s.* each of the salaries of Mr. Lempfert and Mr. Gold, as from April 1st, 1914, on the understanding that future increases are of £20 in accordance with Minute 425, unless the maximum has been otherwise reached, and date from April 1st, were approved.

Allowances of £2 2*s.* each for the payment of fees for evening classes to M. H. Megrah and L. G. Hemens were approved.

With reference to Order 267 the Director was authorised to intimate to Miss H. M. Powell that she would not be re-appointed as from 1st August, 1914, unless some more satisfactory arrangement can be made than hitherto.

Failing any satisfactory arrangement the Director was authorised to recommend a person for appointment as junior professional assistant.

Applications from the following were also ordered to stand over for future consideration :—

Mr. W. H. Dines on behalf of W. H. Baker.
Mr. H. Harries.
C. E. Goad.

The promotion of F. Levin on to the staff as from 1st April, 1914, was approved on the understanding that either he or Mr. B. Francis would be transferred to the Office, and that the vacant place at the Observatory would be supplied from the office staff, the transfer to take effect not later than 1st July, 1914.

Read—Letter 1893/W.07 from Commander Hepworth expressing his thanks for the decision recorded in Minute 443.

New Appointments.—Reported—that an examination for the appointment of two probationers or boy clerks had been held on 17th March. One of the appointments fills the vacancy caused by the retirement of Mr. J. A. Curtis, and the other appointment is a new one on the telephone staff in accordance with the arrangement set out in Minute 432. The following candidates are selected for appointment as probationers :—

Joseph Chaytow, born 6th July, 1896, to commence duty as telephone clerk on 15th April.

Hugh Thomas Smith, born 27th November, 1897, to commence duty in the "Section Mondial" on April 1st, and to be paid according to boy clerk's scale until he attains the age of 17.

Approved.

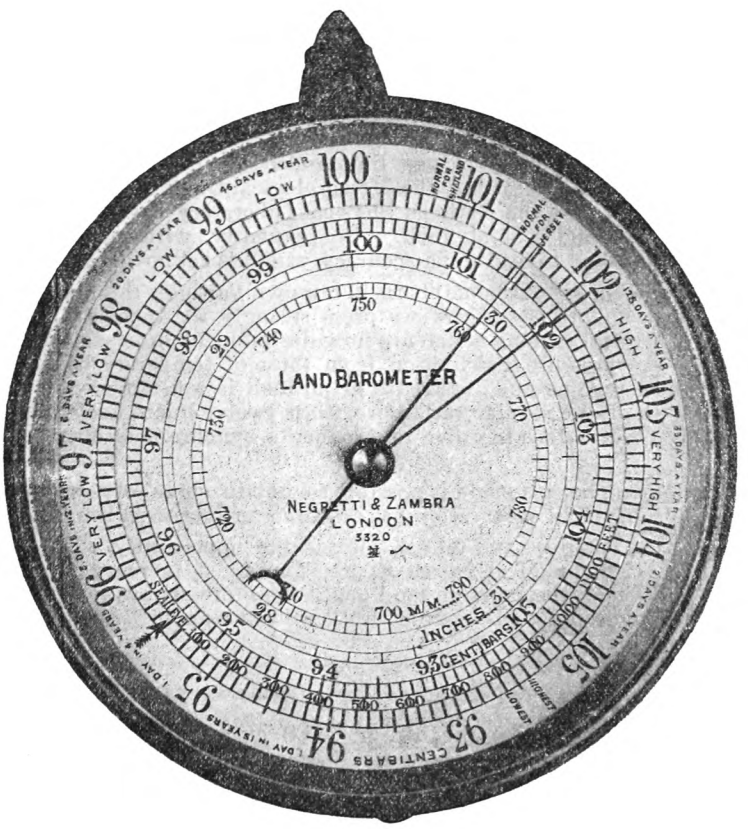
452. Daily Weather Service.—**New Units for Pressure.**—Submitted—the following memorandum :—

Barometric Pressure in Pressure Units.

In their Eighth Report to the Lords Commissioners of His Majesty's Treasury, the Meteorological Committee intimated their intention to use Absolute Units for pressure in the Daily Weather Report of the Meteorological Office from 1st May, 1914.

The most suitable units of pressure on the C.G.S. system are the "bar" with its submultiples, the centibar and millibar. The relation between the centibar and the commoner units, the inch and millimetre of mercury, is shown on the barometer dials which are reproduced below—100 centibars, or one million dynes per square centimetre, are equivalent to 750·1 mm. or 29·53 inches. The relation

with the pressure units which engineers use is not represented on the dial because it is dependent on latitude. Subject to the necessary correction on that account 100 centibars are equivalent to 14½ lbs. per square inch.



Reasons for the Change.

One of the principal reasons for this change is that it is a step towards the adoption of a system of units which may become common to all nations.

The system was approved by the Meteorological Council in 1904 and by the Gassiot Committee of the Royal Society in 1910. Upon the initiative of Professor V. Bjerknes, formerly professor at Christiania and now of the Geophysical Institute at Leipzig, it was used in important publications of the Carnegie Institution of Washington and was adopted by the International Commission for Scientific Aeronautics for the international publication of the results of the investigation of the Upper Air. Since 1907 the system has been used in the Meteorological Office for the upper air, and since 1911 for the data from the Observatories where C.G.S. units have been used for many years in connexion with Magnetism and Electricity. The Weather Bureau of the United States has adopted *millibars* and *absolute temperatures on the Centigrade Scale* for the issue of daily charts of the Northern Hemisphere, which began on 1st January, 1914; the Royal Meteorological Society has decided to use *millibars* for the expression of the series of pressure normals for the British Isles, which it is now preparing; and the Meteorological Office has followed the example of the Weather Bureau in using absolute units for the daily maps in the weekly Weather Report, but its isobars are figured in centibars instead of millibars, as they were in the specimen issued with the Eighth Annual Report.

The Scientific Appeal.

The ground of scientific appeal to all nations to adopt the C.G.S. system is that the bar, centibar, and millibar are actually "units of pressure," and it is pressure which has to be expressed, whereas the inch and the millimetre are really units of length and require elaborate numerical calculations in order to arrive at a real measure of pressure. Pressure may be effectively expressed in pounds per square inch—the atmospheric pressure in Britain ranges ordinarily between 13¾ lbs. per square inch and 15¼ lbs. per square inch—but for scientific precision it is better to employ a unit which is independent of latitude.

The C.G.S. system has already become universal for Magnetism and Electricity, so that its principles are well known.

Practical Considerations.

While there are good reasons on scientific grounds for the adoption of units on the same system as those in use for Electricity and Magnetism, there are also substantial practical advantages which must not be overlooked.

Meteorologists have now made what practically amounts to a preliminary meteorological survey of the Globe. A working idea of the distribution of pressure and temperature over land and sea can now be given. The next steps are to add to the precision of the mean values, and to bring in relation thereto the daily values as used in the construction of synchronous charts. It has, for example, been pointed out (*see* "Nature," February 26, 1914) that there must be characteristic differences between synoptic charts of equatorial areas and those of other parts of the Globe. The pressure changes in those areas are small, and consequently this step in further progress requires greater accuracy and a higher degree of precision than is now customary in actual practice either on land or sea.

Barometers for the Navy and Mercantile Marines are now graduated to read to half a hundredth of an inch only, formerly, like those figured in the *Barometer Manual*, and still issued to land stations, they were graduated to read to thousandths of an inch.

It is acknowledged that an accuracy of one thousandth of an inch is not really attainable in practice. For many years the Inspectors of the Meteorological Office have had to be satisfied with agreement within ·003 in., and now the National Physical Laboratory has ceased to certify barometers of the Kew pattern to the thousandth of an inch. Consequently, with an instrument graduated to ·001 in., observers are being asked to read to an accuracy which is acknowledged to be unattainable.

For the purpose of drawing synchronous charts in our own latitudes the highest possible precision is necessary, for the requirements of air-services press strongly for increased precision. Moreover synchronous charts of equatorial regions which are now desirable in order to study the difference in the general character of the pressure distribution from those of temperate latitudes, and to connect north and south. For those regions one hundredth of an inch is not sufficiently precise ; it is only about one-fifth or one-sixth of the regular variation within twelve hours, for which correction would have to be made to ships' observations in order to produce a synchronous chart of a tropical ocean region.

Now that wireless telegraphy has made it possible to obtain ships' observations for plotting on synchronous charts, each individual observation has acquired an increased importance.

Graduation in centibars, millibars and tenths, affords the opportunity which is desired for the improvement in accuracy. The practical degree of precision for a mercury barometer of the Kew type is one-tenth of a millibar. Observers on land ought therefore always to agree in their readings to the last figure, and we ought not to be content until we have an instrument which will give the same degree of accuracy at sea.

Percentage Barometer.

Another practical advantage is that the bar, or C.G.S. atmosphere, differs but little from the standard atmosphere. Consequently readings of the barometer in centibars are percentages of the C.G.S. atmosphere. An inspection of the illustrations already given will make this clear. It is apparent that the ordinary range of pressure in the British Isles is from 95 centibars to 105 centibars. "100 centibars" marks on the dial the position which has been occupied for so many years by the word "change."

The Correction and Reduction of the Readings of Barometers as graduated in C.G.S. units.

Within the last few decades it has become the rule to take account of the variation of gravity with latitude in addition to the corrections previously in vogue, and it is important to make clear whether the correction for latitude has or has not been employed in any charts which may be issued in future. In the charts in common use the correction is not made, but the practice now followed in the use of a mercury barometer is to apply the following corrections and reductions with the object of obtaining the equivalent reading in standard-mercury inches or millimetres at sea level.

1. A correction for index error in different parts of the scale, taking account, if necessary, of the diameter of the cistern.
2. A correction of the reading for temperature.
3. A correction for the difference of latitude from 45°.
4. Reduction to sea level.

The various corrections introduced under 1, are made primarily by the original graduation and the table of Kew corrections ; so far as the observers are concerned they are included with those numbered 3 and 4 in a single table for the reduction to sea level, with the dry bulb temperature as argument. The table has separate columns for different limits of pressure as read and corrected for temperature.

The correction for temperature (2) is dealt with by a special table.

This abbreviation of the process is not disclosed in the Observer's Handbook which gives separate tables for temperature correction, latitude correction and reduction to sea level. These tables are applicable to Fortin barometers equally with Kew barometers, provided that the Kew corrections are duly applied in either case.

The object of all this arithmetical manipulation is to give the pressure in *true mercury inches in latitude* 45°. The introduction of mercury barometers graduated for pressure in absolute measure involves the multiplication, somewhere in the process, of the barometric height by a fixed factor converting the standard-mercury inch into C.G.S. units ; the factor is, in fact, introduced in the earliest stage of the process, the graduation of the instrument by the maker, and is therefore included in the Kew certificate. After its introduction the corrections for temperature and for latitude have still to be accounted for. The reduction to sea level is on a different footing, but that also has to be dealt with.

Viewed from the point of view of absolute units, the sole purpose of going through the process suitable for getting true mercury inches is *to "make good" the factor which has been used for conversion in the graduation* engraved on the instrument. Since the readings are the subject of

considerable corrections it has been necessary to distinguish them from units of pressure and to invent the name "baromil" for them, because it allows for the factor of conversion but not for the corrections which ought to be, but are not, applied before the factor of conversion is brought into operation.

It is clearly unnecessary to adhere to the process suitable for standard inches when the object in view is really millibars, unless it simplifies practice; and the following considerations show that practice might be much simplified by going straight from the scale value to absolute units.

The corrections for temperature and latitude are both factors of the pressure. The corrections at 1,000 millibars, taken from the Observer's Handbook, p. 145 and p. 149, are as follows :—

Temperature Correction.		Latitude Correction.	
Temperature (Absolute).	Correction.	Correction.	Latitude.
°	mb.	mb.	°
273	0	−2·6	0
275	·3	−2·0	20
280	1·1	−1·3	30
285	2·0	−0·5	40
290	2·8	+0·5	50
295	3·6	+1·3	60
300	4·4	+2·0	70
305	5·2	+2·6	90

The range of correction of both happens to be 5·2 mb. So if the 1,000 baromil reading happened to be *correct at* 289° *in lat.* 45°, we could put the table in the following form :—

Temperature Correction.		Latitude Correction.	
Temperature (Absolute).	Correction.	Correction.	Latitude.
°	mb.	mb.	°
273	+2·6	−2·6	0
275	+2·3	−2·3	11
280	+1·5	−1·5	26
285	+0·6	−0·6	38
289	0	0	45
290	−0·2	+0·2	47
295	−1·0	+1·0	56
300	−1·8	+1·8	67
305	−2·6	+2·6	90

The correctness of the reading at 289° at Lat. 45° would take account of index errors, cistern corrections and everything but *scale-graduation-error* and reduction to sea level; and from the table it appears that if it were correct at 289° for Lat. 45° it would be correct at some appropriate temperature within the scale of Table I (*a*) of the Observer's Handbook at each latitude, and the graduations would thus be in *millibars correct at* 289° *for Lat.* 45°, *at* 273° *for the equator and at* 305° *at the poles.* They would also be correct for all pressures at that temperature provided the scale was uniformly graduated.

Thus instrument makers could make a *millibar* barometer *correct at a certain temperature for a given latitude.* If used at any other latitude it would require only correcting for temperature, differential error of scale, and reduction to sea level, and this might be accomplished in a single table.

Our present instruments which are actually made to read true mercury inches at about 271° in latitude 45°, might bear the legend "Correct in latitude 45° at temperature 271°."

Instead of our present tables we should have—

1. A table of corrections for differences of temperature from the standard temperature for the latitude.
2. A table of reduction to sea level including the scale correction.

Practical course to be pursued.

It is evidently impossible at one operation to change all the barometers in use in the various services, and even in the most favourable circumstances there must be for many observers a time when the readings are taken on one scale, and the results quoted or published in another. It is proposed at first to have barometers graduated in both scales, and to issue these to the Telegraphic Reporting Stations by May 1st, and always to issue barometers graduated in both scales in the near future. As a matter of fact the actual barometric *readings* which have to be remembered are few; it is mostly their differences which count. We give here the C.G.S. equivalents for a few salient points.

1 centibar (cb) = 10 millibars (mb), and is approximately 3/10th inch.
1 "mercury-inch" = 33·8632 mb.

Extremes of Pressure :—

Highest pressure recorded in the British Isles ... ... 1053·5 mb. Aberdeen. 31st Jan., 1902.

Lowest „ „ „ ... ... 925 mb. Ochtertyre 26th Jan., 1884.

Lowest pressure recorded at sea (Atlantic) ... ... 925 mb. 5th Feb., 1870.

The Daily Range of Pressure is ... ... in Tropical Seas 2·4 to 2·7 mb. in the British Isles 0·7 mb.

Pressure and Temperature at different heights :—

Height.	Pressure.	Temperature.	Height.	Pressure.	Temperature.
Kilometres.	Millibars.	°Absolute.	Kilometres.	Millibars.	°Absolute.
15	119·5	—	7	405·0	239·5
14	140·5	219·5	6	466·0	247·0
13	164·0	220·5	5	534·0	254·5
12	192·0	221·0	4	609·5	261·0
11	223·0	223·0	3	694·0	267·5
10	260·0	225·5	2	787·0	273·0
9	302·5	229·3	1	891·5	277·0
8	350·5	233·5	0	1007·5	280 5

This shows a change of 116 millibars for the first 1 kilometre or 1 millibar for 9 metres or 30 feet at sea level. The change for every 100 m. is very closely 3·4 × (pressure ÷ temperature).

Mean Annual Pressure and Range for different Latitudes along Meridian 30.

Latitude.	Mean Annual Pressure.	Range.	
		Winter.	Summer.
60°N.	1006 millibars	61 mb.	34 mb.
50	1013	51	27
40	1018	42	20
30	1020	22	14
Nn. Tropic	1018	14	10
Equator	1013	7	7
Sn. Tropic	1018	12	12
30°S.	1018	19	20
40	1013	27	34
50	1002	41	54
55	999	44	59
		Summer.	Winter.

The average frequency of occurrence of pressures of various magnitudes in the British Isles is set out in the following table :—

Limits in Centibars.	Aberdeen.	Valencia.	Kew.	Average.
94–95 ...	—	1 day in 5 years	—	1 day in 15 years.
95–96 ...	1 day in 2 years	1 day in 5 years	—	1 day in 4 years.
96–97 ...	3 days a year ...	2 days a year ...	1 day in 10 years	3 days in 2 years.
97–98 ...	10 days a year ...	6 days a year ...	3 days a year ...	6 days a year.
98–99 ...	26 days a year ...	21 days a year ...	14 days a year ...	20 days a year.
99–100 ...	57 days a year ...	42 days a year ...	39 days a year ...	46 days a year.
102–103 ...	109 days a year ...	123 days a year ...	133 days a year ...	122 days a year.
103–104 ...	29 days a year ...	37 days a year ...	34 days a year ...	33 days a year.
104–105 ...	1 day a year ...	3 days a year ...	3 days a year ...	2 days a year.
Above 105 ...	2 days in 5 years	1 day in 3 years	—	1 day in 4 years.

W. N. SHAW,
Director.

Meteorological Office,
London, S.W.
April, 1914.

New Telegraphic Code from May 1st, 1914.—Submitted—the following circulars issued on March 14th, 1914, to the Meteorological Services of Europe by the Director, as President of the International Commission for Weather Telegraphy, explaining the new code for continental and British weather telegrams, as approved by the International Meteorological Committee in Rome, 1913.

INTERNATIONAL METEOROLOGICAL COMMITTEE.

COMMISSION FOR WEATHER TELEGRAPHY.

SUMMARY OF REPLIES RECEIVED IN ANSWER TO A CIRCULAR LETTER ADDRESSED TO THE INSTITUTES ON DECEMBER 20TH, 1913, ENCLOSING A COPY OF THE NEW CODE FOR WEATHER TELEGRAMS, APPROVED BY THE INTERNATIONAL METEOROLOGICAL COMMITTEE AT THE MEETING AT ROME IN APRIL, 1913, WITH CERTAIN REDACTIONAL CORRECTIONS, AND ASKING FOR INFORMATION AS TO THE INTENTIONS OF THE DIRECTORS IN VIEW OF THE APPROACH OF MAY 1ST, 1914, THE DAY FIXED BY THE COMMITTEE FOR THE CHANGE TO THE NEW CODE.

For convenience of reference the new code is set out in a separate circular, of which a copy is enclosed herewith.

AUSTRIA.

HOFRAT TRABERT writes, under date January 7th, that the code as set out in the circular will be introduced in the Austrian system from May 1st, 1914, with the following additional modifications:—

(1.) The weather characteristic V will refer to the period of 24 hours ending at the hour of morning observation.

(2.) For reporting temperatures near the freezing point, and for rounding off exact halves of degrees, the code of the Deutsche Seewarte (*see* below) will be used.

(3.) Observations of cloud motion and the characteristic of the barometric tendency will be given by a selection of stations only.

(4.) Wind force will be given on the Beaufort Scale, which has now been introduced in the Austrian system. Sea disturbance will be reported on the international scale.

No change will be made in the hours of observation at Austrian stations, which remain 7, 14, 21 hr. Middle European Time.

DENMARK.

CAPTAIN RYDER writes, under date January 13th, that the Danish Meteorological Institute is willing to adopt the code as set out in the circular at the five stations, Skagen, Hanstholm, Blaavands Huk, Copenhagen and Hammeren, which report to foreign countries, from May 1st, 1914. The code for reporting temperatures near the freezing point, and for rounding off exact halves of degrees, will be that of the Deutsche Seewarte (*see* below).

No change will be made in the code now in use at stations in Iceland and Faröe.

EGYPT.

The Director-General of the Survey Department writes, under date January 7th, that the code as set out in the circular will be adopted at international stations in Egypt from May 1st, 1914.

GERMANY.

ADMIRAL BEHM, the Director of the Deutsche Seewarte, writes, under date January 31st, that the code as set out in the circular will be adopted, with the following additional modification, at the stations of the Deutsche Seewarte, from May 1st, 1914.

Additional Modification.—At temperatures near the freezing point the following code will be adopted:—

−2·5° to −1·6°	coded 52	0·0° to + 0·4°	coded 00
−1·5° „ −0·6°	„ 51	+0·5° „ + 1·4°	„ 01
−0·5° „ −0·1°	„ 50	+1·5° „ + 2·4°	„ 02

The principle of rounding off the exact half degrees in the direction of the algebraically higher temperature will thus be carried through.

The Directors of other institutes in the German Empire have intimated that the same code will be adopted in their respective systems on the same date.

GREAT BRITAIN.

The form of code as set out in the circular will be introduced into the British service on May 1st.

Consequent upon the introduction of millibars as pressure units in the publications of the Meteorological Office, pressure values will be reported in millibars and tenths, the initial 9 or 10 of the reading being omitted. Thus a reading of 1013·2 millibars, the equivalent of 760·0 mercury millimetres or 29·92 mercury inches, will be coded as 132.

The unit of barometric tendency will be 0·5 millibar, the equivalent of 0·37 millimetres. A negative value of the tendency will be reported by adding 50 to the code figures, thus 56 will stand for a fall of the barometer of 6 half-millibars (2·3 mercury millimetres).

Temperatures will be reported in degrees Fahrenheit. Rainfall will be reported in millimetres.

HOLLAND.

DIRECTOR VAN EVERDINGEN writes, under date December 24th, that the code as set out in the circular will be adopted in the system of the Netherlands Meteorological Institute from May 1st, 1914.

HUNGARY.

DIRECTOR RÓNA writes, under date January 4th, that the code as set out in the circular will be adopted in the Hungarian system.

ITALY.

M. PALAZZO, on December 26th, 1913, circulated a letter stating that the new code would be introduced at Italian stations on January 1st, 1914. This step has now been taken. The code in use differs from the code as set out in the circular in that the characteristic of the weather, V, refers to the interval of 24 hours ending with the hour of morning observation.

The hours of observation at Italian stations are 8 h. and 21 h. of Middle European Time.

RUSSIA.

PRINCE B. GALITZIN, Director of the Central Physical Observatory, writes that no change will be made in the code used at Russian stations in the year 1914. The chief reason for this decision is that from the year 1915 a night service will be organised in St. Petersburg.

The changes to be introduced at that epoch are still under consideration.

As intimated in the circular letter of December 20th, provisional acceptance of the new code had been received before that date from the Institutes of the following cities :—

Athens, Bukharest, Helsingfors (to date from January 1st, 1915), Kristiania, Lisbon, Madrid, Stockholm, Trieste, Zurich.

The position of the French Meteorological Service has been made known in a letter circulated by M. Angot in December, 1913.

W. N. SHAW,
President.

Meteorological Office,
London, S.W.,
March, 1914.

INTERNATIONAL METEOROLOGICAL COMMITTEE.

COMMISSION FOR WEATHER TELEGRAPHY.

New Telegraphic Code for Meteorological Information within the European System in 1914.

A full meteorological telegram consists of six groups, each of five figures, reporting the observations of the morning and the previous evening, and arranged as follows :—

I.—FOR CONTINENTAL REPORTS.

	(1)	(2)		
Observations of the previous evening—	BBBWW	SHTTV		
	(3)	(4)	(5)	(6)
Morning Observations—	BBBWW	SHTTC	βbbRR	MMmm Sea.

BBB = Pressure at Mean Sea Level and latitude 45°, to 0·1 mm. The hundreds of millimetres are omitted :

763·5 mm. coded as 635

WW = Direction of the Wind, true, not magnetic, to 16 points of the compass. Only even numbers are telegraphed. N = 32, W = 24, S = 16, E = 08, &c.

S = Force of the Wind by Beaufort's scale. If the wind exceeds force 9, the figure 9 is inserted in the code, and the actual force reported at the end of the telegram.

H = Hydrometeors or Weather at the time of observation—

Amount of cloud
- 0 = cloudless.
- 1 = sky $\frac{1}{4}$ clouded.
- 2 = sky $\frac{1}{2}$ clouded.
- 3 = sky $\frac{3}{4}$ clouded.
- 4 = sky completely clouded.
- 5 = Rain.
- 6 = Snow.
- 7 = Mist, Haze.
- 8 = Fog.
- 9 = Thunderstorm.

The occurrence of hail, lightning, aurora, &c., is reported in words at the end of the message.

TT = *The temperature of the dry bulb in whole degrees centigrade. Temperatures below the freezing point are indicated by adding 50 to the reading, thus : —12° C. is coded 62.

V = "Characteristic" of the weather for the interval between the hours of morning and evening observations.—

0 = Mainly fine.
1 = Fair (Ci and Ci-St. preponderating).
2 = Mainly overcast (low clouds preponderating).
3 = Sheet lightning, more than one flash ; of importance after periods of heat or drought.
4 = Precipitation, mainly during the forenoon (between observations I. and II.), without thunderstorms, or with at most one peal of thunder without lightning.
5 = Precipitation, mainly during the afternoon (between observations II. and III.), without thunderstorms, or with at most one peal of thunder without lightning.
6 = Mainly foggy.
7 = Thunderstorm.
8 = Passing showers (squally changeable weather with bright intervals).
9 = Persistent precipitation (including falls of snow or soft hail of long duration, sky overcast during the intervals).

When several code figures are applicable to the same day, the one which the observer considers of greatest importance should be selected.

C = Direction from which upper clouds are moving, according to 8 points of the compass—

0 = Clouds observed, but no appreciable motion detected.
1 = Clouds travelling from N.E.
2 = " " " E.
3 = " " " S.E.
4 = " " " S.
5 = Clouds travelling from S.W.
6 = " " " W.
7 = " " " N.W.
8 = " " " N.
9 = No observation.

β = The "characteristic" of the barometric tendency :—

0 = Steady.
1 = Unsteady.
2 = Rising continuously.
3 = Falling continuously.
4 = Falling at first, now rising.
5 = Steady at first, now rising.
6 = Steady at first, now falling.
7 = Fall checked, now nearly steady.
8 = Rise checked, now steady or falling.
9 = Crochet d'orage, Gewitternase, Line-squall.

The characteristic refers to changes taking place within the three hours for which the numerical value of the barometric tendency is estimated. If a station have no barograph, or if the instrument fail to record, the figure 0 is inserted in the code, and the numerical value of the barometric tendency is replaced by the figures 99 (*see* below).

bb = The barometric tendency, *i.e.*, the change of the barometer in the three hours preceding the hour of observation. The specification is to millimetres and decimals.

Negative tendencies (fall of the barometer) are specified by adding 50 to WW, the code figures for wind direction. Changes of barometer exceeding 9·8 mm. are reported by the code figures 98.

If the tendency cannot be given, the figures 99 are inserted in the telegrams.

RR = The rainfall in millimetres. The following code figures are used with special significance :—

00 = No precipitation.
99 = Precipitation has occurred, but its amount has not been measured.
98 = Precipitation exceeding 96 mm.
97 = "Trace" of precipitation, amount less than 0·5 mm.

Amounts exceeding 96 millimetres are reported in full at the end of the message, the figures 98 being inserted in the code.

MM = Maximum temperature
mm = Minimum temperature } for the 24 hours ended at the time of morning observation, in whole degrees. Temperatures below freezing point are specified as in the case of TT (*see* above).

Sea = Sea disturbance on the scale 0-9 :—

0 = Calm.
1 = Very smooth.
2 = Smooth.
3 = Slight.
4 = Moderate.
5 = Rather rough.
6 = Rough.
7 = High.
8 = Very high.
9 = Phenomenal.

II.—For British Telegrams.

The form is the same as for Continental telegrams, viz. :—

Observations of the previous evening—		(1) BBBWW	(2) SHTTV	
Morning observations—	(3) BBBWW	(4) SHTTC	(5) βbbRR	(6) MMmm Sea.

* For temperature within half a degree of the freezing point of water the following code was recommended :—

°C.	°C.		°C.	°C.	
—1·4 to	—0·5	to be telegraphed as 51.	+0·1 to	+0·4	to be telegraphed as 00.
—0·4 to	0·0	" " 50.	+0·5 to	+1·4	" " 01.

The *Deutsche Seewarte* has suggested and will adopt the modification :—

°C.	°C.		°C.	°C.	
—1·5 to	—0·6	to be telegraphed as 51.	0·0 to	+0·4	to be telegraphed as 00.
—0·5 to	—0·1	" " 50.	+0·5 to	+1·4	" " 01.

The symbols used have the following meanings :—

BBB = Pressure at Mean Sea Level in millibars and tenths. The initial 9 or 10 is omitted. 1013·2 mb. is coded as 132.

WW = The Direction of the Wind, as in Continental Telegrams.

S = Force of the Wind, by Beaufort's scale, as in Continental Telegrams.

H = Hydrometeors, as in Continental Telegrams.

TT = The temperature of the dry bulb in whole degrees Fahrenheit.

V = The "Characteristic" of the Weather for the interval between the morning and evening observations, as in Continental telegrams.

C = The Direction from which upper clouds are moving, as in Continental telegrams.

β = The "Characteristic" of the barometric tendency, as in Continental telegrams.

bb = The barometric tendency. The specification is to half-millibars. Negative tendencies are specified by adding 50 to bb.

RR = The Rainfall in millimetres, as in Continental telegrams.

MM = Maximum temperatures
mm = Minimum temperatures } for the 24 hours ended at the time of morning observation in degrees Fahrenheit.

Sea = Sea disturbance on the scale 0 to 9, as in Continental telegrams.

The date for the commencement of the New Code is May 1st, 1914.

TABLE FOR CONVERTING PRESSURE VALUES FROM MILLIBARS TO MERCURY MILLIMETRES.

Millibars.	0·0	1·0	2·0	3·0	4·0	5·0	6·0	7·0	8·0	9·0
	MERCURY MILLIMETRES.									
920	690·1	690·8	691·6	692·3	693·1	693·8	694·6	695·3	696·1	696·8
930	697·6	698·3	699·1	699·8	700·6	701·3	702·1	702·8	703·6	704·3
940	705·1	705·8	706·6	707·3	708·1	708·8	709·6	710·3	711·1	711·8
950	712·6	713·3	714·1	714·8	715·6	716·3	717·1	717·8	718·6	719·3
	700+									
960	20·1	20·8	21·6	22·3	23·1	23·8	24·6	25·3	26·1	26·8
970	27·6	28·3	29·1	29·8	30·6	31·3	32·1	32·8	33·6	34·3
980	35·1	35·8	36·6	37·3	38·1	38·8	39·6	40·3	41·1	41·8
990	42·6	43·3	44·1	44·8	45·6	46·3	47·1	47·8	48·6	49·3
1000	50·1	50·8	51·6	52·3	53·1	53·8	54·6	55·3	56·1	56·8
1010	57·6	58·3	59·1	59·8	60·6	61·3	62·1	62·8	63·6	64·3
1020	65·1	65·8	66·6	67·3	68·1	68·8	69·6	70·3	71·1	71·8
1030	72·6	73·3	74·1	74·8	75·6	76·3	77·1	77·8	78·6	79·3
1040	80·1	80·8	81·6	82·3	83·1	83·8	84·6	85·3	86·1	86·8
1050	87·6	88·3	89·1	89·8	90·6	91·3	92·1	92·8	93·6	94·3

DIFFERENCES.	
Millibar.	Millimetre.
0·1	·1
0·2	·2
0·3	·2
0·4	·3
0·5	·4
0·6	·5
0·7	·5
0·8	·6
0·9	·7

TABLE FOR CONVERTING BAROMETRIC TENDENCY REPORTED IN HALF MILLIBARS TO MERCURY MILLIMETRES.

Code Figures of Tendency (Positive).	0	1	2	3	4	5	6	7	8	9	Code Figures of Tendency (Negative).
	MERCURY MILLIMETRES.										
00	0·0	0·4	0·8	1·2	1·5	1·9	2·3	2·6	3·0	3·4	50
10	3·8	4·2	4·6	5·0	5·3	5·7	6·1	6·4	6·8	7·2	60
20	7·5	7·9	8·3	8·7	9·0	9·4	9·8	10·1	10·5	10·9	70
30	11·2	11·6	12·0	12·4	12·7	13·1	13·5	13·8	14·2	14·6	80
40	15·0	15·4	15·8	16·2	16·5	16·9	17·3	17·6	18·0	*	90

Meteorological Office, London,
March, 1914.

Telegraphic delays.—Reported—that the Director of the Netherlands Service had complained of the late arrival of morning messages sent direct to Amsterdam from Lerwick, Holyhead and Cahirciveen, and had instanced 3rd February, 1914, as a day when the messages were unusually late. Upon representing the matter to the Post

Office, it had transpired that while the time occupied in telegraphing the messages from the stations to the Central Telegraph Office on that day varied from 8 to 13 minutes, the interval between the times of receipt in London and re-despatch to Amsterdam, during which the messages lay in the Central Telegraph Office, varied from 26 minutes to 38 minutes.

Multiple Addresses for Telegrams.—Reported that application has been made to the Post Office for permission to use a multiple address telegraph form for telegrams to more than one address which are identical in text, in order to obviate the necessity (1) for the Office staff to write out the text on a separate form for each address and (2) for the Post Office staff to signal the text separately for each address between South Kensington and the Central Telegraph Office. A reply has been received (M.O. 694) to the effect that a special "A" form will not be required. The list of addresses may be written on a sheet of paper and attached to the "A" form containing the text of the telegram.

The letter continues, that it is the usual practice when the Postmaster-General arranges for the acceptance of a batch of telegrams to charge a copying fee of 1*d.* for each set of ten or part of ten addresses, and that it is proposed to make this charge against the Office. The arrangement has been accepted though the charge seems high in view of the facts that the number of telegrams in a batch rarely exceeds two or three, and that the arrangement is designed to save the time of Post Office servants at least as much as of the Office staff. It is estimated that the additional charge to the Office will be from £5 to £10 per annum.

453. Observatories.—**Kew.**—*Library* (Minute 444).—Read—a report from Miss Powell, forwarded by Dr. Chree (1295/CK. 23), with reference to the compilation of a new Subject catalogue for the library at Kew observatory, and the provision of a new card-index cabinet with four drawers.

The purchase of a card-index cabinet for the Subject catalogue was approved.

Grounds and Fencing.—Reported—that the fence of split chestnut with wire lacing referred to in Minute 444 had been ordered.

Also—that the fence would reduce the area of the paddock by about 1·2 acres, leaving about four acres available for pasturage to the Mid-Surrey Golf Club. The Golf Club had thereupon requested that an abatement of £1 per annum should be made in the rent of £5 now paid for the grazing.

The Director was authorised to allow the reduction if no alternative presented itself.

454. Meteorological Office, Edinburgh.—Submitted—the following statement with reference to the fees for the supply of information by the Edinburgh Office, drawn up by Dr. Wedderburn and Mr. Watt. The statement is similar in all respects to that in use by the Central Office except that the fee charged by the Office in London for one day's attendance in court to "prove" records is £2 2*s.* instead of £1 1*s.* It had been pointed out in a letter dated 14th March, that the fee of £1 1*s.* would not compensate the Office for the loss of a day of the Superintendent's time. Under the terms of the arrangements for the Edinburgh Office (Minute 393) these fees are payable to the account of the Scottish Meteorological Society.

Meteorological Office, Edinburgh.—Supply of Information and Charges.

The official publications of the Offices in London and Edinburgh and such manuscript returns as are filed in Edinburgh may be consulted or copied at the Office free of charge, by any person, by permission of the Superintendent. Extracts from them are supplied to any person making written application to the Superintendent specifying precisely the details of the information required. For these extracts a charge is made to cover the cost of the time required for selecting and making them. The usual minimum charge is 5*s.* [There are certain special exceptions with a smaller charge; a schedule of these will be sent on application.]

The extracts will, if required, be attested by a sworn declaration before a Justice of the Peace at a fee of 10*s.* 6*d.* A fee of not less than £1 1*s.* is charged if a representative is required to attend in Court in Edinburgh to swear to the correctness of the extracts supplied.

Approved.

Stationery.—Subject to the approval of the Stationery Office, the issue of special stationery, &c., for the use of the Edinburgh Office was approved.

455. STATIONS.—**Tunbridge Wells.**—Submitted—the following correspondence :—

SIR, 2nd August, 1914.

I HAVE been in communication with Mr. T. J. G. Duncanson, of Oakhurst, Tunbridge Wells, executor of the late F. G. Smart, M.A., M.B., of Bredbury, Tunbridge Wells, with reference to the meteorological observations at that centre.

Using the exceptional facilities of his house and grounds for the purpose, Dr. Smart has carried on for many years a most valuable series of observations of pressure, temperature, humidity, rainfall, and sunshine, in connexion with the Royal Meteorological Society. In accordance with an arrangement of long standing, a selection of the observations has been passed on by the Society to this Office, in order that they might be incorporated in the results compiled for the use of the public, and represented by the Weekly and Monthly Weather Reports of which I have the honour to enclose specimens.

Dr. Smart, being a physician and a botanist, took a keen personal interest in Meteorology, which is closely connected in ways that are still ill-defined, with hygiene and horticulture, and in consequence the observations that came to us from Bredbury were highly esteemed as being in every way trustworthy, and therefore scientific.

Two years ago the Royal Meteorological Society decided to discontinue the collection of observations, and the work was therefore handed over to this Office, and the station at Tunbridge Wells came under my personal cognisance as Director of the Office.

Dr. Smart's lamented death has brought the valuable series of observations to an end unless provision can be made for a station to take the place of that which he maintained. In a situation like that of Tunbridge Wells it is by no means easy to find a suitable site, because a free exposure is required and most people not already surrounded by houses like to surround themselves with trees. The provision of a station of this character is not strictly speaking within the obligations of my office, because we are concerned primarily with the weather as affecting the country generally, and we look to the various localities to keep, for local purposes, a proper record of the weather, but in the public interest I am concerned for the co-ordination of the observations which are made in all localities—a necessary condition of their utility, and I have according taken the matter up with Mr. Duncanson in the hope that Tunbridge Wells may not cease to be represented in the list of stations enumerated in the circular of which I enclose a copy.

On visiting the town with this object, I went over the neighbourhood, and found that the best site for the purpose is on the common to the west of the cricket field. I am therefore writing to ask you, as Lord of the Manor, to sanction the use of a piece of ground there for the exposure of the instruments. If you are willing to give that permission I should make it my duty to represent to the local authority the desirability of their placing the work on a permanent footing by providing for the continuity of the observations, and for the display of the information obtained in such a way as to be of the greatest utility to the public.

The extent of the ground required is about 30 feet by 30 feet, whether square or circular does not matter. It would be necessary to enclose it by some sort of railing, as a protection against the mischievous, otherwise the freer the exposure, and therefore the less fencing, the better.

The instruments which I should recommend to be exposed there are : —

(1) A rain gauge (a copper can 5 inches or 8 inches in diameter and 1 foot high) :

(2) Four thermometers in a white painted wooden louvred screen about 2 feet by 1 foot 3 inches, standing on legs about 4 feet high :

(3) A thermograph and a hygrograph to give a continuous record of temperature and humidity, exposed in a second similar screen ;

(4) A grass thermometer for recording night frosts, supported on two twigs just above the grass :

(5) A sunshine recorder, a glass ball in a metal bowl, which would have to be 8 to 10 feet above the ground to catch the sun at mid-winter :

(6) An anemograph to record the direction and velocity of the wind. This last would require a light skeleton steel tower, 20 to 25 feet high, with a hut about 5 feet square at its base to hold the recording part.

The situation is really governed by the requirements of the sunshine recorder, which has to be placed so that it can practically see the sunrise and sunset at any time of the year, and therefore requires a good horizon between North-east and South-east and between North-west and South-west. Moreover, to catch the mid-day sun in mid-winter in the latitude of Tunbridge Wells one must be at least six times its height away from any tree due South, and of course a greater distance still from trees not due South.

There is one point of the common which I believe just satisfies all these requirements, and I hope you will see your way to approving of the exposure of the instruments there.

You will see from the list of stations in the circular which is enclosed that public bodies and private persons in all parts of the country help in this endeavour to keep a satisfactory record of the weather, which is of interest to everybody and of economic importance to large numbers.

I shall be glad to give any further information which you may desire, or to show you at this Office—if you should happen at any time to be in London—specimens of any of the instruments which I am proposing to recommend.

I am, &c.,

W. N. SHAW.

Frank O. Baird, Esq.,
39, Church Road,
Hove, Brighton.

39, Church Road,
Hove, Sussex.
February 10, 1914.

DEAR SIR,

Meteorological Station on Tunbridge Wells Common.

REFERRING to your letter of 2nd August and 13th January, having regard to the purpose for which the land is required, I am prepared, subject to your obtaining the consent of the Freehold Tenants of the Manor, to let you have the piece of land referred to, on an annual tenancy, at a rent of £12 per annum.

Yours faithfully,
FRANK O. BAIRD.

The Director,
Meteorological Office.

Mr. Middleton requested that a copy of the correspondence be sent to him for the use of the Board of Agriculture and Fisheries.

In the meantime it is understood that arrangements are in progress for a station to be set up in one of the Corporation Parks.

456. DIRECTOR'S REPORT AND ACCOUNTS :—

New Publications.—Copies of Geophysical Memoirs, Nos. 6 and 7, published since the last meeting, are placed on the table.

Meteorological Charts of the World.—Hydrographer's Proposal.—Reported—a letter dated 18th December, 1913, was received from the Hydrographer in which he referred to a proposal to produce in his Department, primarily for the benefit of H.M. Navy, monthly Meteorological Charts of the World; each chart to contain "all available data relating to winds, currents, &c.," collectively, in place of the existing charts which deal with the respective elements separately, in order to reduce the number of charts that, under present conditions, have to be consulted.

The Hydrographer asked that assistance might be afforded his Department in this matter; and added that, should the proposal be assented to, he would instruct an Officer to attend at the Office for the purpose of explaining more fully the details of the scheme.

The following draft reply to the Hydrographer was prepared and circulated to the Committee :—

SIR,

WITH reference to your letter of the 18th December, 1913, I have to say that the preparation of Charts of the Meteorological Elements for all parts of the Globe has been one of the principal objects of this Office from its commencement, and, indeed, for the first five years of its existence as a department of the Board of Trade the compilation of data for the Oceans which could be expressed in charts was its sole object.

2. For all the more frequented Oceans, the necessary work of compiling data and charts for currents, pressure, winds, temperature and humidity also in some parts, has already been completed in this Office. The Charts representing the work have been published partly by the authority of the body controlling the office and partly by your Department.

3. Charts such as you suggest, embodying *all* the available data for each month are now issued regularly by this Office for the North Atlantic and Mediterranean and for the Indian Ocean. The material for corresponding charts for the South Atlantic Ocean, and for the North-western Atlantic (Baffin Bay and Davis Strait) is nearly ready. The China Sea will be included in the Indian Ocean chart in due course. The material available for the Pacific Ocean has hitherto been regarded as too much limited to certain trade routes to justify the charting of meteorological curves.

4. The charts referred to in paragraph 3 are already in use for the Mercantile Marine. No demand has hitherto been received for their issue to H.M. Ships.

5. I am accordingly gratified to learn that it is proposed now to produce for the benefit of H.M. Vessels, Meteorological Charts of the World for every month in the year, each chart containing *all* the available data, and I shall be glad to place at your disposal for that purpose any of the material which we possess, either in the form of the data from our finished charts or of the working sheets leading up thereto.

6. I have had the material which we have ready set out on twelve small globes, three for each quarter, in the Office Museum. We have not in every case monthly summaries.

7. I ought to make some reservation as to any further assistance which this Office could render to the accomplishment of this project. We have only a small staff, and its whole time might easily be devoted to the compilation and maintenance of such charts of normals for the Globe, making monthly charts where now only quarterly ones exist, and so improving the charts in successive editions. Their time would be occupied in working forward towards an ideal for these charts which is still some distance off. I should feel it right to remember that so far as Meteorology is concerned, the preparation of such a set of normals is only a step: it is not the end. We have been trying for some years, and with some anxiety, to take up the most important question of the deviation from normals in successive years, and have been hampered by a series of accidents, though some progress has already been made. In undertaking to help with the preparation of the charts of the World, I should have to see that the other parts of meteorological work were not left unprovided.

8. Your letter refers to charts of the *World*, and not merely of the Oceans. In that case the undertaking would concern not only the Marine Department, but the section of this Office which is conventionally called here the *réseau mondial*. It is the proper avenue for progress in Meteorology,

and as such is a magnificent enterprise well worthy of all the attention that can be given to it. But the staff which I have at present disposable for this purpose consists of one person, so that without some further assistance my contribution would be very slender.

I am, &c.,
W. N. SHAW.

The Hydrographer,
Admiralty, London, S.W.

In a letter acknowledging the receipt of the above draft, dated 3rd January, 1914, the Hydrographer repeated his suggestion that an officer from his Department should attend at the Office for the purpose referred to, and mentioned that the expression "all the available date," in his former letter, was liable to misunderstanding.

Subsequently, acting upon the Director's instructions, the Marine Superintendent made an appointment with the Hydrographer's representative, Lieutenant Vivian Brandon, R.N., who called and furnished more definite information regarding the scheme, and indicated the nature of the assistance which the Office could give.

All M.O. Charts that would be required in the preparation of the proposed Atlas were produced by the Marine Superintendent, and a list of these was taken by the officer. The methods of utilising the same were discussed; and it was arranged that Lieutenant Brandon or, in the event of his going afloat, his successor should confer with the Marine Superintendent from time to time, as occasion required.

The officer, since then, has been appointed to the Command of a Destroyer and the proposal is necessarily postponed for the present.

Recommendations of the Derelicts Committee of the Board of Trade.—In response to a letter dated 23rd October, 1912 (M.O. 3925), from the Secretary to the Derelicts Committee, convened by the Board of Trade, asking if a representative of the Meteorological Office could attend at a meeting of the Committee to be held on the 30th of that month, for the purpose of giving evidence I arranged for the Marine Superintendent to attend the meeting. In accordance with a further request of the Committee the following short précis of the evidence to be given was submitted in advance :—

(1) The average number of reports of derelicts, in the North Atlantic, published in each weekly issue of Monthly Meteorological Charts of the North Atlantic and Mediterranean.

(2) The sources from which the reports are derived, and the average number of reports obtained each week from each source :—

(*a*) Meteorological Registers.
(*b*) Shipping and Mercantile Gazette.
(*c*) Liverpool Journal of Commerce.
(*d*) United States Hydrographic Office Bulletin.
(*e*) Board of Trade Notices to Mariners.
(*f*) Messages by radio-telegraphy received through the courtesy of the Cunard Steamship Company.
(*g*) Messages by radio-telegraphy received direct from Ships through Wireless Stations.

(3) Method of representing the information on the Meteorological Charts :—

On the back of each weekly issue of the Meteorological Charts five insets are exhibited, showing the mean distributions of air and sea surface temperature, and of fog during each of the respective weeks; also the positions of derelicts observed during each of five weeks.

The latest inset relates to the week which ended 12 days prior to the date of issue of the Chart. By studying the positions of the derelicts indicated in this manner, it is frequently possible to trace the drifts of these dangers to navigation; and thus, in a measure, to estimate their future movements. To afford instances of this procedure the Charts of November, 1910, February and June, 1911, will be produced.

On the 8th April, 1913, during my absence at Rome, a communication from the Board of Trade was addressed to me with regard to certain recommendations of the Derelicts Committee, which was accompanied by the Report of the Committee in which Captain Hepworth's evidence on behalf of the Office was included.

This letter, my reply to it, and the ensuing correspondence read as follows :—

Board of Trade (Harbour Department),
7, Whitehall Gardens, London, S.W.,
8th April 1913.

SIR,

I AM directed by the Board of Trade to transmit to you the accompanying copy of the Report made to them by the Departmental Committee appointed to inquire and report as to the measures at present taken to protect shipping from the dangers of floating derelicts and sunken obstructions.

The Board will be glad to be favoured at an early date with your observations on the recommendations contained in the Report as far as they relate to the Meteorological Office.

I am, &c.,
GARNHAM ROPER.

Meteorological Office,
South Kensington, London, S.W.,
21st April, 1913.

SIR,

ON my return home from a Meeting at Rome of the International Meteorological Committee, I hasten to acknowledge the receipt of a copy of the Report of the Departmental Committee on Derelicts, and Mr. Granham Roper's letter asking for my observations on the recommendations contained in the Report so far as they relate to the Meteorological Office.

I note that among the conclusions and recommendations enumerated on pages 11 and 12 there are three which may be regarded as relating to the present work of the Meteorological Office, viz. :—

(*c*) on the overlapping in regard to the receipt and dissemination of information relating to derelicts ;

(*d*) on the free distribution to Masters of ships of the Meteorological Office charts ;

(*e*) on the appointment of Lloyd's as the central body for the reception and dissemination of such information.

Before referring to these recommendations, I should like to make a remark as to why the Meteorological Office interests itself in derelicts at all, seeing that though many of them are in a way attributable to meteorological causes, they are not strictly speaking to be classed as meteorological elements. Meteorology concerns itself particularly with pressure and winds, and from the time of its establishment under the Board of Trade, the Meteorological Office has devoted a good deal of attention to the subject of ocean currents.

Derelicts form, in a remarkable way, a touchstone of our knowledge of the elements which are our primary concern. Why a derelict should be in a particular locality, and still more, why it should move from one locality to another, are questions which epitomise the general meteorological problem for those parts of the ocean in which derelicts are met with. So much so that it is to a certain extent a practice, not on the part of this Office, but of some of those interested in such matters, to create artificial derelicts in the shape of bottles containing a dated paper, which are thrown overboard for the purpose of identifying the general drift of currents. For Meteorologists a derelict is a "bottle paper" on a large scale, which challenges attention somewhat in the same way as the disaster to the "Titanic" challenges attention to the question of floating ice, although the problem itself is not really dependent upon such striking instances. Hence, apart from the general interest of the Office in the dissemination of any information useful to sailors, we have a professional interest in derelicts.

I may now refer to the three recommendations (*c*), (*d*) and (*e*).

1. Read together they seem to require some amplification or explanation. If Lloyd's becomes the central body for the reception and dissemination of information regarding derelicts, and the Meteorological Office is at the same time responsible for preparing charts for delivery to the Masters of ships, the Office becomes a medium for the dissemination of information, which should certainly include that which Lloyd's receives, and hence provision ought to be made for the information to be passed on from Lloyd's to the Office without delay, in order that the charts may not fail to give the latest information. In the absence of any such provision, which would secure adequate co-operation, the action of the Meteorological Office might become "overlapping," which is deprecated in recommendation (*c*).

2. Supposing, however, that co-operation is duly provided for, the free distribution of charts recommended under (*d*) falls to be considered as a means of disseminating the information.

From the inception of the Meteorological Office in 1854 it has been a recognised principle that publications should be presented in recognition of observations voluntarily contributed. It is, however, difficult to maintain the converse of that principle after the long years of compilation, and in the circumstances, no objection would be raised on the part of the Office to the waiver of this principle in the case of the Atlantic Charts, if the Board think it desirable to act upon recommendation (*d*). Some machinery would be necessary for carrying out the supply effectively, and it would clearly be desirable for the Masters of ships to have the latest issue of the charts.

The Office has no machinery of its own for meeting applications for the charts at the ports, and it would have to rely upon the good offices of the Board of Trade in the matter. Upon consideration, I do not think it would be practicable to keep suitable stocks at the ports to meet an altogether uncertain number of applications, more especially as the authorities of the United States distribute their charts broadcast through meteorological agents at the ports on the other side of the Atlantic. The only effective plan would seem to be to place them on the same footing as the "Notices to Mariners," and to place the copies on board with the ship's papers. We could, if it is thought desirable, alter the date of the weekly issue from Thursday, our present day, to any other day in the week except Tuesday and Saturday. On these days we could not get the work through our printing press. If this suggestion were adopted we could more easily arrange for the delivery of a suitable number of copies to the Mercantile Marine Offices.

3. With regard to recommendation (*c*), in so far as the Office is concerned we should be glad to take part in any conference with a view to avoiding overlapping, and in the event of the dissemination of the information directly from Lloyd's being regarded as sufficient for practical purposes, we should be content to hand ever to Lloyd's such information as may come to the Office, for Lloyd's to deal with.

At the same time I may say that we regard the use of the back of the monthly chart as a specially appropriate method of distributing the information which we get, because it shows the most recent facts in relation to other elements which enable the Masters of ships to use the information in the most effective manner.

I am, &c.,
W. N. SHAW.

Board of Trade (Harbour Department),
7, Whitehall Gardens, S.W.
15th August, 1913.

SIR,

WITH reference to your letter of the 21st April last (No. 1540–125) on the subject of the Report of the Departmental Committee appointed to inquire and report as to the measures at present taken to protect ships from dangers of floating derelicts and sunken obstructions, I am directed by the Board of Trade to inform you that the Board have arranged for the Committee of Lloyd's to be the central body for the reception and dissemination of information relating to derelicts as recommended by the Departmental Committee, and for Lloyd's to send to the Meteorological Office without delay all such information reaching them, and that the Board are glad to learn that the Meteorological Office is ready to reciprocate by sending to Lloyd's any information received by them.

I am to add that as the Board issue weekly supplementary summaries of notices to mariners containing the latest information regarding derelicts, they do not think, as at present advised, that it will be necessary for the Meteorological Office to alter their present practice in connection with the issue of their charts either by changing the day of issue or by extending the present system of free distribution of copies.

I am, &c.,
GARNHAM ROPER.

The arrangements referred to in Mr. Garnham Roper's letter of the 15th August have since been brought into operation ; and at the request of the Secretary to the Committee on Safety of Navigation of the International Conference on the Safety of Life at Sea, at which the Office was represented by the Marine Superintendent, acting in the capacity of Expert Consultant, a statement was forwarded setting forth the methods at present adopted by the Office for collection and dissemination of recent information relating to drifting ice and derelicts in these terms.

The Meteorological Office obtains information regarding ice and derelicts from the following sources :—

(1) The Admiralty (occasionally).
(2) Shipmasters who contribute Meteorological Registers (chiefly).
(3) Shipping and Mercantile Gazette.
(4) Liverpool Journal of Commerce.
(5) United States Hydrographic Bulletin.
(6) Board of Trade Notices to Mariners.
(7) Cunard Steamship Company.
(8) Wireless Telegraph Stations on the Coast (occasionally).

The information is published by the Office on the Monthly Meteorological Charts of the North Atlantic, which can be purchased at the price of 6*d.* per copy or 5*s.* per annum, but are issued gratis to masters of ships who furnish the Office with Meteorological observations.

Derelicts.—The information relating to derelicts (*i.e.*, to abandoned vessels and large portions of such vessels) is indicated by means of a special inset map shown on the back of the Chart. On this inset, the latest reports of derelict ships sighted in the North Atlantic, are shown in geographical position. If known, the name of the abandoned vessel is given, and when a derelict can be located on two or more successive dates, the drift of the vessel is indicated by a connecting dotted line.

Ice.—The information relating to ice observed during the four weeks previous to the issue of the Chart, is exhibited on the face of the Chart, by means of symbols, plotted in geographical position.

The Charts are published monthly, but are issued in weekly editions which contain the most recent information on each weekly instalment issued every Thursday.

Should a report relating to ice or derelicts be received at the Office on Thursday morning, it would appear on the Chart for that day.

Recent reports of ice and derelicts are marked also on the inset maps relating to Sea and Air Temperature, which are given on the back of the North Atlantic Chart. Each inset refers to a particular week, and the latest inset to the week which ended 12 days prior to the date of issue of the Chart.

Board of Trade.—International Convention for the Safety of Life at Sea.—Submitted a copy of the official report in French of the above Convention, which had met during 1913 and 1914 under the presidency of Lord Mersey, and had been represented by the following countries :—Germany, Austria-Hungary, Belgium, Denmark, Spain, United States, France, Great Britain and Ireland, Australia, Canada, New Zealand, Italy, Norway, Netherlands, Russia, Sweden. Captain Hepworth had acted as expert assessor to the British delegates. The Convention provides, *inter alia*, for the destruction of wrecks, and for the study and observation of ice and research on floating ice, to be carried out at international expense, towards which Great Britain will contribute 30 per cent. and the United States, Germany and France 15 per cent. each. The United States are to be invited to undertake these services. Codes are drawn up for the communication by radio-telegraphy of information regarding ice and weather to the Hydrographic Office in Washington or to the Meteorological Office in London.

Board of Agriculture.—Fisheries Committee.—Submitted—copy dated 1st January, 1913, of the first report of the Committee appointed by the President of the Board of Agriculture and Fisheries to advise the Board on questions relating to the elucidation through scientific research of problems affecting fisheries. Captain Hepworth, Marine Superintendent, serves on this Committee. One result is that samples of water are now being collected by marine observers of the Office on vessels crossing the Atlantic, and the samples are analysed by the Government Chemist for the Board of Agriculture with a view to determining the salinity of the samples. The results obtained are published in map form on the back of the Monthly Meteorological Charts of the North Atlantic.

Co-operation in Pilot Balloon Soundings.—*Farnborough, Falmouth, Eskdale Observatory Aberdeen, Pyrton Hill, Upavon.*—A request has been received from the President of the International Commission for Scientific Aeronautics, transmitted through the Foreign Office, asking for daily records of soundings by means of pilot balloons, from stations. The hours between 11 a.m. and 1 p.m. G.M.T. are named as most suitable for these observations.

In addition a request has been received from Geheimrat Assmann, the Director of the Lindenberg Observatory, for the results of soundings made at British stations to be communicated to him by telegraph. These observations are intended for use in the daily reports prepared at Lindenberg for the use of aviators. These reports are issued by 2 p.m. G.M.T. and the data can only be incorporated if they reach Lindenberg before that hour.

Geheimrat Assmann suggests between 7 a.m. and 8 a.m. G.M.T. as the most suitable time for these observations, but observations taken during the forenoon are also acceptable.

Observers at British stations are therefore requested to arrange the times of their ascents so as to fall in with one or other of these two requests in so far as this can be done without inconvenience.

The resolution of the International Commission naming 7 a.m. G.M.T. as the most suitable hour for observations on the so-called "international days" still stands.

A sounding which can be worked up as a single theodolite sounding by noon should be reported by telegram to the Meteorological Office, in order that it may be retransmitted from there to Lindenberg.

Farnborough and Upavon will exchange their observations and thereby endeavour to make an effective daily record for both stations.

On occasions selected by the experience of airmen on notice issued from Upavon or Farnborough as well as on the international days or as agreed upon beforehand, co-operative soundings will take place for the purpose of the careful study of the local presentation of special conditions.

Any one of the co-operating stations may ask for a special sounding for a meteorological reason indicated in the telegram of the request.

E.g.—If Falmouth at 11 o'clock identifies a line squall going East, the observer would ask for soundings from other stations at a specified hour. If Upavon finds the air exceptionally bumpy and wants to trace the reason, he can ask for soundings, or if Ditcham has forewarning of a coming thunderstorm, he might ask for soundings.

It would be understood that these are only matters of request with which the other observers do not undertake to comply, but as being able to help one another effectively by co-operation, they would do their best to comply.

It is proposed to utilise the half page hitherto left blank in the issues of the Daily Weather Report for Sundays for the publication of particulars of ascents made during the preceding week and reported by telegram or postcard before the Report is sent to press.

Code for reporting Pilot Balloon Observations.

The code consists of groups of five figures. The first group T w_1 w_2 t c (prefixed at Geheimrat Assmann's request) is made up as follows :—

T	= the time of the ascent, to the nearest hour ...	by special codes given below.
w_1	= weather at the time of commencement of the ascent	
w_2	= " " " end " "	
t	= barometric changes in progress	
c	= motion of Cirrus or other high cloud	

The subsequent groups give the result of the ascent, each group of figures reporting wind at a specified height acccording to the scheme H WW SS :—

H = Height in kilometres above M.S.L.
WW = Component *from* West in metres per second.
SS = Component *from* South " " " "

Negative values of WW and SS, *i.e.*, Components from *East* or from *North* are reported by adding 50 to the velocity figures. For example, 36521 stands for a velocity of $\sqrt{15^2 + 21^2} = 26$ m/sec. from about SSE at 3 kilometres.

Groups of figures in form 0 WW SS and 5 WW SS placed after the initial group reporting time of the ascent may be used for reporting the surface wind and the components at 500 m. Should the height attained exceed 10 kilometres, the figure in the tens place expressing height need not be telegraphed. Thus a fifteenth group of figures in form 21516 will be interpreted as reporting a S.W. wind at 12 kilometres.

Special Codes for use in Compiling Group I.

Time Code T:—

Code Figure	6	7	8	9	0	1	2	3	4	5
Hour	6	7	8	9	10	11	12	1	2	3
or	16	17	18	19	20	21		3	4	5

It is assumed that ascents made between hours 21 and 1 will not be telegraphed, also that ascents will be telegraphed, if at all, within an hour or so of taking the observations so that no confusion can arise between a.m. and p.m. hours.

Weather Code w. (The usual code used in international telegrams :—

0=sky clear (cloud amount 0 or 1 on scale 0 to 10).
1=sky about $\frac{1}{4}$ clouded (amounts 2, 3).
2=sky about $\frac{1}{2}$ clouded (amounts 4–6).
3=sky about $\frac{3}{4}$ clouded (amounts 7, 8).
4=sky overcast (amounts 9 and 10).
5 = rain falling.
6 = snow.
7 = mist or haze.
8 = fog.
9 = thunderstorm.

Code for motion of barometer t:—

0 = steady.
1 = falling slightly.
2 = falling moderately.
3 = falling fast.
4 = falling very fast.
5 = rising slightly.
6 = rising moderately.
7 = rising fast.
8 = rising very fast.
9 = unsteady.

Code for motion of Cirrus cloud C:—

0 = no Cirrus observed.
1 = Cirrus from N.E.
2 = Cirrus from E.
3 = Cirrus from S.E.
4 = Cirrus from S.
5 = Cirrus from S.W.
6 = Cirrus from W.
7 = Cirrus from N.W.
8 = Cirrus from N.
9 = Direction not determined.

Meteorological Office,
3rd February, 1914.

Reports of Work (January and February, 1914).—0. *Administrative Division.*—Library, Réseau Mondial & Technical Inquiries :—

Library :—

	Jan.	Feb.
Authors' cards prepared for Catalogue	50	100
Total number of Publications received	756	801

Alteration of shelf mark of books in catalogue proceeded with.

Book plates placed in 746 volumes.

Inquiries :—

	Jan.	Feb.
Newspapers	6	0
Legal	9	19
Scientific and Commercial	92	59
Forecasts	0	2
General	0	3
	£ s. d.	£ s. d.
Receipts in connexion with Inquiries	16 19 6	7 6 6

112 MS returns received in January and 43 in February from Foreign and Colonial Stations.
Tables prepared for the Admiralty South America Pilot, Vol. 2, and Australia Directory, Vol. 3.

Publications.—Report for January and February, 1914, from Clerk of Publications :—

—	January.		February.	
	Received.	Issued.	Received.	Issued.
Daily Weather Report	875	842	875	861
Weekly Weather Report	375	340	375	343
Monthly Weather Report, &c. ...	575 (Dec.)	481 (Dec.)	—	—
Do. do. (Maps) ...	25 (Dec.)	2 (Dec.)	—	—
Annual Summary, 1913	—	—	675	483
Do. do. (Maps)	—	—	25	2
Daily Readings	75 (Nov.)	55 (Nov.)	75 (Dec.)	52 (Dec.)
Geophysical Journal, 1913	150 (Jan.)	—	150 (Feb.)	—
Hourly Values.—Meteorological, 1913 :—Kew.	300 (Jan.)	—	—	—
Eskdale	—	—	—	—
Valencia	300 (Jan.)	—	300 (Feb.)	—
Hourly Values—Geophysical ...	—	—	—	—
Monthly Meteorological Charts (Atlantic).	600 monthly (to Feb 3).	545	600 monthly (to Mar. 3).	467
Monthly Meteorological Charts (Indian).	350 (Feb).	270	350 (Mar.)	256
International Upper Air Observations, 1912.	—	—	—	—
Eighth Annual Report	—	3	—	1
Observer's Handbook (1913) ...	—	57	—	9
"Forecasting Weather"	—	—	—	—
Cloud Atlas	—	—	—	1
Report — Commission for Weather Telegraphy.	—	—	—	—
Report—Commission for Maritime Meteorology.	—	1	—	—
Codes of Signals, 1913	—	1	—	1
Calendar, 1914	—	119	—	1
Structure of the Atmosphere ...	—	—	—	—
Geophysical Memoirs, No. 1	—	—	—	2
No. 2	—	—	—	3
No. 3	—	1	—	2
No. 4	—	—	—	2
No. 5	—	52	—	324
No. 6	—	—	600	347
No. 7	—	—	600	346

Receipts from sales at M.O.—January, £6 10*s.* 10*d.*, February, £1 16*s.* 2*d.*

New Publications.—Geophysical Memoirs Nos. 6 and 7 have been received from the Stationery Office and issued along with No. 5. The Seaman's Handbook of Meteorology, Rome Report, Circulars 001 (A–H and J), and Geophysical Memoirs Nos. 8, 9 and 10 are in the press.

M. O. Press.—During the two months ended 28th February, 1914, the issue of the periodical publications has been as follows :—Daily Weather Report, maps for the Weekly Weather Report, maps for the Monthly Weather Report, Monthly Meteorological Charts of the North Atlantic, Monthly Meteorological Charts of the Indian Ocean, as contract.

On 1st January there were four requisitions for forms, and one requisition for plates for the Seaman's Handbook, outstanding. Since that date five requisitions have been issued and six discharged, leaving four requisitions in all still on hand.

One hundred and fifty additional copies of the Daily Weather Report have been printed during the period in compliance with requests received from Educational Authorities.

1. *Marine Division.*—Examined 41 Meteorological Logs and 5 Lighthouse Registers.

Monthly Meteorological Charts of the North Atlantic and Mediterranean.—Issues for February and March published. Chart for April sent to Lithographer. Drawing inset charts for weekly issues. Charting sea and air temperatures for November, December, January, February, and March. Registering and acknowledging observations, issuing charts, and renewing supply of forms. Received 180 North Atlantic Registers, Form 121, and 111 Radio-telegraphy Registers, Form 138.

Monthly Meteorological Charts of the Indian Ocean.—Issues for March and April published, and the chart for May in course of preparation. Received 18 reports of Indian Ocean weather, Form 122.

Wireless telegrams from ships.—Preparing weekly list of sailings. Extracting and tabulating marine observations, also preparing each week a sea temperature chart of the North Atlantic. Obtaining corrections for 68 barometers. Acknowledging reports and issuing copies of instructions and observation forms.

Reports of Ice sent to "Shipping Gazette".—6.

Monthly Meteorological Charts of Davis Strait and Baffin Bay.—Preparation of data for wind roses, drawing wind roses, isobars, and isotherms.

Observational duties.—Time occupies 71 hours.

Extraction of observations relative to selected areas for the Dutch Meteorological Institute.—233 hours.

Indexing of data in ocean 10° squares.

Information for solicitors in connection with a salvage case and for Board of Trade.—The collating and charting of Monthly Salinity and Surface Temperature observations in the North Atlantic in connection with investigations being carried out by the Fishery Branch of the Board of Agriculture and Fisheries.

2. *Forecast Division.*—(Central Office).—Mr. Goldie was on duty at the Office from January 19th, Mr. Harries being absent through illness from January 8th to February 10th. Mr. Goldie has assisted in the routine work of the division by preparing the "remarks" for the Annual Summary and checking the 8 p.m. forecasts. He has also had in hand the charting of the results of pilot balloon ascents sent in from stations in this country and from abroad.

The checking of the 8 p.m. forecasts and also that of the storm warnings for 1913 has been completed and the results have been summarised for the next Annual Report.

The number of wireless messages received has been :—

	January.	February.
From H.M. Ships	3	2
From Ships of the Mercantile Marine...	394	421
Inquiries	—	—
Prepaid Replies	14	17
Other Telegraphic Inquiries	2	0
Telephone Inquiries	7	4

(Falmouth Observatory.)—Owing to Mr. Goldie's absence from the observatory, as explained above, the work with pilot balloons has been suspended. The routine work of observing and tabulating or analysing and summarising the records for Falmouth has been kept up to date. The anemometer records from Pendennis Castle and Scilly have been analysed at the observatory, and the results have been sent up for publication in the Weekly Weather Report. The arrangements for the exhibition of information at the Custom House are proceeding. The exhibition will commence as soon as the Office of Works supplies the notice boards now on order.

(Branch Office at South Farnborough.)—The whole of the premises intended for the use of the department have now been taken over by Mr. Dines. Workmen are engaged in fitting benches, cupboards, &c., in the workshop, so that Mr. Dines may look forward to being able to make effective use of this room at an early date. The furnishing of the remaining rooms is making progress.

The instruments have been set up, with the exception of the anemometer, and some of the recording instruments for which the necessary screen has not yet been received. Regular observations at 7 a.m., 1 p.m., and 6 p.m. commenced on March 1st. The arrangements for setting up the anemometer are under consideration.

Data for the construction of the coming weather chart are telegraphed from the Meteorological Office to South Farnborough each evening, Saturdays and Sundays excepted. A map has been drawn by Mr. Dines and exhibited along with forecasts at the entrance to the Royal Aircraft Factory. Notice boards are being prepared for an effective exhibition of meteorological information in a conspicuous position in the grounds of the Factory.

Pilot balloon ascents are made daily when conditions are favourable. During February 15 ascents were recorded.

Arrangements have been made for the records from selected stations to be analysed at the Branch Office, in order that the staff may have an opportunity of scrutinising traces from a number of stations and noting their peculiarities.

Mr. Billett has continued experiments with the tetranemograph.

3. *Statistical Division.*—British Meteorological and Magnetic Year Book 1912–1913.

Part I.—Weekly issues up to date.

Appendix I.—4th Quarter issued.

From the beginning of 1914 a table of summaries of wind for anemograph stations has been included in the Report. Velocities published in the table are expressed in metres per second. Weekly values of mean pressure expressed in millibars have been included in the table for districts.

Part II.—December, 1913, issued up to date.

Owing to the changes made in the form of the tables at the beginning of 1914, the Report for January was issued four days late.

In addition to the re-arrangement of the tables of climatological data, a new table giving the summary of the wind velocity at anemograph stations is included in the Report. The values of pressure published in the Report are now expressed in millibars, and the values of wind velocity in metres per second.

The Annual Summary for 1913, which included a number of additional tables, was completed and issued at the beginning of February.

Part III.—(1) Monthly issues up to date.

(2) February and March, 1913, sent to the printer.

Part IV.—(1) February and March, 1913, prepared for printer.

(2) The volume for 1912 is in the press.

Tables have been prepared for the Annual and Quarterly Reports of the Registrars-General for England and Ireland.

The examination of the observatory records and of the sunshine cards returned to observers. The tabulation of cup anemograms have been kept up to date. The summaries of pressure tube anemograms are now prepared week by week.

Five cards from each of 24 stations, for which the sunshine cards are filed in the office, were re-measured for December.

The rainfall returns from 84 stations have been examined and summarised up to date.

4. *Instruments Division.*—A barometer has been issued to H.M.S. "Lancaster" on a requisition from the Admiralty.

Thermometers have been issued to the Liverpool agent, and four complete sets of instruments have gone to the Hull agent. Instruments have been supplied direct from the Office to eight ships. Thermometers have been issued to seven sea-temperature stations.

Three storm warning cones have been issued. Barometers with the new pressure scales have been sent to eight telegraphic stations—Stornoway, Castlebay, Lerwick, St. Ann's Head, and Donaghadee receiving two each—Portland, North Shields, and Jersey one each.

Twenty telegraphic stations are now provided with barometers graduated according to the new scale.

The following telegraphic stations have not yet received millibar barometers :—

M.O. Stations. —Valencia, Roche's Point, Birr, Dungeness, Scilly, Spurn Head.

Private Stations.—Liverpool, Newquay, Clacton, Bath, Dover.

A cloud camera has been provided for use at Eskdale Observatory, as well as three dozen balloons.

A pair of special goggles and a Besson's nephoscope have been sent to Falmouth.

The barograph tabulator for Aberdeen has been re-graduated and repaired.

Twenty-three requisitions from private observers and corporations have been carried out, the most important being the outfit of a Climatological Station at Rathgar, Dublin.

The instruments returned from the "Scotia" have been delivered to the Board of Trade for sale to the American Government. The following articles, the property of the Board of Trade, remain at the Office :—Four hand winders for kites and two special pulleys. The following instruments, which it is agreed shall be regarded as part of the outfit for upper air research purchased by the £50 grant from the British Association, are also at the Office :—

One head for Dines anemometer, M.O. 8.

One portable Dines pressure tube, M.O. 17.

Four kite meteorographs, M.O. 1–4.

Fifteen balloon meteorographs, 1, 2, 3, 4, 5, 6, 327, 329, 332, 333, 356, 357, 358, 359, 361.

One set of weights in box (·001 to 100 grammes), M.O. 1.

Eight consignments have been dispatched to the Dominions, including a standard barometer and other instruments for the new Cape Observatory.

Six boxes for the return of meteorographs have been sent out. Two of these went to Lode, Cambridgeshire, in which place two meteorographs sent up on consecutive days at Pyrton Hill fell.

A station barometer with the new pressure scale has been sent to Captain Tamplin, Amoy, China ; new thermometers have been sent on loan to Cape Pembroke, Falkland Islands ; a new sunshine recorder has been lent to the station at Phœnix Park, Dublin, to replace an old one which is to be returned to the Office. A marine rain-gauge has been lent to Mr. H. Swithinbank, for trial on the S.Y. "Venetia."

On 11th February the Superintendent of Instruments visited Yarmouth. A report dealing with the proposed removal of the Gorleston anemometer and the instruments used at the Yarmouth telegraphic station to the Naval Air Station at the Denes has been prepared.

Observatories.—Kew (January).—The barograph, thermograph, and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination ...	4
	Inclination ...	4
	Horizontal Force	4

Potential Gradient on 17 days.
Wilson apparatus „ 9 „
Ebert „ „ 10 „

International cloud observations were made on three days.

The following instruments were tested :—

6 dip needles sent by Mr. Dover.
2 black bulb solar maximum thermometers.
2 bright „ „ „ „
} For the National Physical Laboratory.

The apparatus used for testing compasses has been handed over to the National Physical Laboratory, which is now ready to undertake the verification of all compasses.

The magnetograph and photographic barograph were dismounted and set up again in their original positions in the basement by Adie.

The seismograph was mounted in the new seismograph room by Mr. Boxall and re-started.

The Skelton clock and the half-second Morrison clock have been brought in and set up, the former in the Superintendent's room, the latter in the computing room.

Particulars of the seismic movements recorded during the second half of 1913, up to the time when the seismograph was dismounted, were sent to Mr. Burgess at Shide.

The geophysical data for August, September, and October have been completed.

Photographic paper has been supplied to Aberdeen and Eskdalemuir Observatories.

(February).—The barograph, thermograph, and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination ...	6
	Inclination ...	5
	Horizontal Force	5

Potential Gradient on 16 days.
Wilson apparatus „ 14 „
Ebert „ „ 13 „
Pyrheliometer (solar intensity) on 4 days.

International cloud observations were made on six days.

One Unifilar magnetometer was tested.

The November and December (1913) data for the Geophysical Journal have been completed and sent to the Office.

Photographic paper has been supplied to Eskdalemuir.

A scale value determination has been made of the electrograph.

Scale value determinations have been made of the horizontal force and vertical force magnetographs, and the sensitiveness of the latter was increased.

A vertical force magnet (intended for the Canadian Meteorological Service) has been received for test from Adie, and experiments are being made to determine the adequacy or otherwise of its temperature correction.

The Ångström pyrheliometer has been set up in the Photographic Laboratory and observations have been restarted. A comparison is in hand between our own instrument and that lent by Mr. Rose of Upsala, to tide over the absence of our own. A comparison has been made of barometer Newman No. 34, and the old Kew large standard.

Eskdale (January).—Staff.—On the 7th Mr. Harris arrived and Mr. Lupton left. Mr. Laidlaw was away ill for a few days at the New Year.

Grounds and Buildings.—The underground is drier than in October. The water removed from the trench since October 24th amounts to only a litre. The air is unhealthy as before.

The floors of the Observatory block have been scrubbed. A second sound-tight door has been fitted to the wireless room. The chemicals have been collected into the room next the dark room, which is used for drying graphs. The light has been let into this room. The room over the workshop has thus been rid of acid fumes and rendered available for brass instruments. This was done last year, but has not been reported till now.

The roof of the East hut is leaking. Pits are ready for trees.

Magnetics.—Absolute observations have been made once a week as usual. Mr. Harris has begun to take them.

A successful dip has been taken with the inductor. The galvanometer mirror is now satisfactory, but the stray field of the control magnet supplied by the Cambridge Scientific Instrument Company was too large. A different arrangement is now in use. The inductor is a convenient instrument to handle.

At the New Year the azimuths of the magnetic recorders were determined and adjusted. See letters of January 6th and 9th, Ref. E80. Three scale tests have been made.

The tabulations have advanced and are in the following state :—

——	N.	W.	V.
Read once	Oct. 11th	To date	Nov. 22nd (start Aug. 1).
Read twice	Sept. 3rd	Nov. 30th	Not yet begun.
Converted to γ	May	April	Do.
P and Q	July	July	—
Final base assigned	Mar. 31st	Mar. 31st	Not yet begun.
Geophysical Journal data ...	Mar. 31st	Mar. 31st	Do.
Monthly Sheets	Feb.	Feb.	—

Meteorology.—Telegraphic reporting began at the New Year. The ordinary climatological observations have been taken as usual and the tabulations are up to date.

On many days a balloon has been flown between 12h. 30m. and 13h. 30m. and an abstract of the results telegraphed at 18h.

Experiments are in progress with an arrangement to keep the rain-gauge warm in snowy weather, and with a device to moisten the wet-bulb hourly during frost.

The scale value of the float barograph has been determined. The installation of the twin pen anemograph has been finished.

Atmospheric electricity.—The electrograph has been working continuously and the curves have been read up to date.

Seismology.—The observations for determining the damping and period of the E-W pendulum and galvanometer have been made. Mr. Burgess, from Shide Observatory, is expected to arrive shortly. The Galitzin tabulations are finished up to May 31st. The Milne tabulations are finished up to September 30th. The Omori has not been working, as its clock is waiting its turn for attention.

Motor car is in working order.

The filing of correspondence is up to date (*i.e.*, within a month).

Information supplied to public *re* Langholm earthquake to Mr. R. L. Graham, Holmwood, Langholm. The Galitzin records showed no trace of this small local shock.

(February).—Staff.—Mr. Richardson has been away on holiday for 10 days from February 18th inclusive.

Official visitors.—Mr. Burgess spent five days at the Observatory at the beginning of the month and Mr. Gold two days later on.

Grounds and buildings.—The underground continues to be reasonably dry, the water removed weekly from the trench remains about the same. The East hut is being papered white by Mr. Laidlaw and is nearly finished.

The ground has been prepared where necessary for the planting of the new trees. Some of these have just arrived and are being put in.

The Stevenson screen has been repainted and has been removed to the fresh position decided upon to the south of the thermograph screen.

Magnetics.—Absolute observations have been made as usual. The inductor has been in regular use in comparison with the weekly observation with the Dip Circle.

The state of the tabulations are as follows :—

——	N.	W.	V.
Read once	Up to date	Up to date	End of November.
Read twice	End of Dec. 1913 ...	End of Dec.	Not yet.
Converted to γ	End of Dec. 1913 ...	End of Dec.	Not yet.
P and Q	July	July	—
Final base assigned	Mar. 31st, 1913 ...	Mar. 31st, 1913 ...	Not yet.
Geophysical Journal data ...	Mar. 31st, 1913 ...	Mar. 31st, 1913 ...	—

Meteorology.—All the ordinary observations have been made and the tabulations are up to date. Pilot balloons have been sent up when possible.

Further experiments have been made with the arrangement for warming the rain-gauge in snowy weather. There is good prospect that these will ultimately be successful.

The anemograph, after a few adjustments had been made and some trouble experienced with the clock, is now working well.

Atmospheric electricity.—The curves have been read up to date and the new scheme for the monthly averages is being entered upon. The recomputing of the 1913 results on the new scheme has not yet been started.

Seismology.—Some work has been done towards putting the standardization of the Galitzin on a better footing, but the standardization itself remains to be done. Preliminary experiments with one pendulum showed that the instrument was not seriously out of adjustment.

Wireless apparatus.—This is working well and regular time signals are obtained by Mr. Skelton.

Information supplied to the Public.—Details of a large earthquake in January supplied to J. E. Crombie, Esq., Dyce, Aberdeen. Some seismological information and data supplied to T. A. Southern, Esq., Universal Mining School, Cardiff, with particular reference to the Senghenydd colliery explosion.

Report on Milne and Galitzin seismographs to Professor Turner.

Motor Car.—This has given all the service required of it. Repairs have again been found necessary and are in progress by the Superintendent and Mr. Stonier. The repair bill tends to be heavy, which is almost inevitable with an old vehicle. Every effort is made to keep it as low as possible by doing all possible work here.

Investigation of the Upper Air (Mr. W. H. Dines's Report of Work for quarter ended 31st December, 1913).—The ordinary work of the station was carried on as usual during the quarter, but Baker's time was largely occupied in the construction of a float barometer.

The good fortune in the recovery of the balloons which marked the first three quarters of the year failed in November. Out of eight sent up during the quarter two only were recovered, and none were recovered out of five sent up in November and December.

I have to point out that I am unfortunately compelled to move before Lady Day and that the expenses are likely to be heavy. A workshop will be required, and after consultation with the Director I have ordered an iron hut 24 feet by 14 feet at a cost of about £50; there will also be the cost of dismantling, moving and re-erecting all the apparatus.

Accounts.—*Allowance for travelling expenses on transfer from Eskdalemuir to London.*—Reported—that on his transfer from Eskdalemuir to the Central Office on 1st October, 1913, Mr. A. E. Gendle, Clerk Assistant, had presented an account for travelling expenses, as follows :—

	Weight. c. q. lbs.	£ s. d.	£ s. d.
Railway fare	—	1 6 4	
Cab in London to convey magnetometer, &c.	—	7 4	
Carriage of personal belongings :—			1 13 8
Bicycle	—	6 6	
Per passenger train	3 16*	3 0	
Per goods train (Carter, Paterson & Co.)	10*	3 2	
Per goods train	6 2 23	1 16 8	
Cartage of above from Observatory to Langholm Station	—	9 0	
			2 18 4
Totals	7 2 21		4 12 0

Director's Order 244 of 1st May, 1913, states that on transfer of service between one of the country observatories and London the Office will make an allowance for travelling expenses.

It was agreed to pay the amount claimed, and to base upon it a scale of allowances for transfer of personal goods according to weight, for use on future occasions.

Submitted—The following statement of the Bank Account in the Cash Book :—

	£ s. d.
Balance on 31st December, 1913	301 18 3
Receipts from 1st January—28th February, 1914	6,082 18 10
	6,384 17 1
Cheques drawn from 1st January—28th February, 1914	4,169 5 7
Balance on 28th February, 1914	£2,215 11 6

* Estimated values. Actual values not given.

1914–1915.

(Tenth year of the Meteorological Committee.)

FIFTY-FIFTH MEETING.

South Kensington, S.W., 29th April, 1914.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

CAPTAIN HARVEY. | MR. MIDDLETON.
DR. SCHUSTER.

457. The Minutes (448–456) of the last meeting (25th March, 1914), were read and confirmed.

458. CORRESPONDENCE.—**H.M. Treasury**.—*Signature of Cheques.*—Reported—that in view of the appointment of Mr. E. L. Ardley to succeed Mr. J. A. Curtis, as cashier, a letter dated 30th March had been written to the Treasury requesting that instructions might be given to the Bank of England, Western Branch, and through them to the London County and Westminster Bank, Brompton Square, to alter, in accordance with Minute 421, the name of the second signatory on cheques drawn on the Committee's account.

In reply the following letter was received :—

Treasury Chambers,
7th April, 1914.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letter of the 30th ultimo (X.05) in which you request that instructions may be given to the Bank of England, Western Branch, to accept the signature of Mr. E. L. Ardley on cheques drawn upon the public account of the Meteorological Office.

Having regard to the established practice of the Public Service generally, My Lords would prefer that the duty of signing cheques should be entrusted to an officer of relatively senior position, and I am to enquire whether the Meteorological Committee are able to suggest any alternative proposal.

In the meantime, in accordance with your informal request, the Bank of England has been requested to accept the signature of Captain Lyons jointly with your own.

I am, &c.,
T. L. HEATH.

The Director
Meteorological Office.

It was resolved that application be made for the signature of cheques by Mr. R. Corless, Secretary, to be approved by the Treasury.

Board of Agriculture and Fisheries.—Reported—the receipt of the following letter from the Board of Agriculture and Fisheries :—

Board of Agriculture and Fisheries,
4, Whitehall Place, London, S.W.,
18th April, 1914.

No. A.1781/1914.

SIR,

I AM directed by the Board of Agriculture and Fisheries to inform you that they have under consideration the question of hydrographical observations in the waters adjacent to the British Isles, and that they are of opinion that it is desirable that a conjoint scheme for the collection of surface samples should be initiated. To this end, they desire me to suggest that experts from the three Departments exercising jurisdiction over the Fisheries of the United Kingdom should, together with a member of the Meteorological Office, meet in consultation to decide upon the lines which the investigation should follow. I am, therefore, to ask whether the Meteorological Office would be prepared to participate in this conference and in that event that the Board may be favoured with the name of the representative of your Department.

I am, &c.,
A. W. ANSTRUTHER,
Assistant Secretary.

The Director,
Meteorological Office,
South Kensington, S.W.

(1310—19) Wt. 39—8045. 25. 12/14. D & S. G 17/ 30.

It was agreed to nominate Captain Hepworth as representative of the Office at the proposed conference.

Board of Trade.—*Convention on International Exhibitions.*—Reported—the receipt of the following communication (1770/C. 03) from the Board of Trade :—

Board of Trade (Commercial Department),
Gwydyr House,
Whitehall, London, S.W.,
21st April, 1914.

SIR,

I AM directed by the Board of Trade to enclose, for the information of your Committee, copy of a Convention on the subject of International Exhibitions which was signed at a Conference held at Berlin in 1912. This Convention has now been ratified by His Majesty the King, though it will not come into force until six months after a sufficient number of the signatory countries have deposited their ratifications.

I AM also to enclose copies of a report and memorandum prepared by the British Delegates at the Conference, from which it will be observed that the main objects of this Convention are to limit the number of great international Exhibitions and to reform their management. For these purposes certain obligations are imposed upon the signatory Governments, which the Board of Trade desire me to bring to your notice, in case any question of taking part in an Exhibition should come before your Department in future.

I am, in particular, to invite attention to Articles 3 and 5 of the Convention, which aim at preventing misapprehension in connection with the application of the terms "official" and "officially recognised" to exhibitions promoted by private enterprise, and to point out that with a view to preventing such misapprehension in the future Article 3 of the Convention provides that no Government patronage shall be accorded to an exhibition unless the Government assumes responsibility for its management.

Although Government patronage is seldom granted to exhibitions in this country, Ministers and responsible officers of Government Departments are frequently invited to allow their names to be associated with privately organised exhibitions ; and while such patronage may not amount technically to official recognition within the terms of the Convention, it is desirable to avoid conveying an erroneous impression that His Majesty's Government are identified with the Exhibtion.

I am also to point out that Article 9 of the Convention provides that Governments shall not participate except at fixed intervals in international universal exhibitions—a universal exhibition being understood as one that is not restricted in scope to a particular trade or trades.

This provision, however, does not limit the right of Government Departments to contribute exhibits illustrative of their own activities to exhibitions of any kind other than Universal International Exhibitions held abroad.

As you are doubtless aware, an Exhibition Branch of this Department was formed in 1908 to deal with all questions relative to exhibitions. This Branch keeps a record of exhibitions held or about to be held in this country and receives information regarding foreign exhibitions from similar organisations established in other countries.

In the event of your Department having at any time under consideration the question of contributing an official exhibit to any International Exhibition the Board of Trade will be glad to be informed, and will readily furnish any information or other assistance in their power which may be useful to your Department either in coming to a decision on the matter, or in negotiating with the authorities of the Exhibition, or in preparing and installing exhibits.

I am, &c.,
GEO. J. STANLEY.

The Director,
Meteorological Office,
Exhibition Road, S.W.

[The Enclosures are not reprinted here.]

Commission on Public Records.—Reported—that the Commission on Public Records which had applied on 30th January, 1912, for information as to the nature and extent of the public records in the possession of the Office had forwarded a proof of the "Second Report of the Royal Commission on Public Records" in which the following reference to the Office appears :—

6. *Meteorological Office.*—This office, which, in addition to its headquarters in South Kensington, has six observatories or branch offices in various parts of the United Kingdom, was instituted in 1867, when it took over a collection of meteorological documents accumulated by the Board of Trade. The records are of four kinds : (1) records of scientific observations at the office and its observatories, dating back to 1868 ; (2) meteorological registers from stations in the British Isles and British Possessions ; (3) meteorological logs specially prepared on board certain ships of the Royal Navy and the Mercantile Marine for the information of the office at the instance of the Admiralty, and the Board of Trade ; (4) charts and schedules of the Daily Weather Service dating back to 1860. Information has also been extracted from many thousands of ships' logs which have been requisitioned for the purpose from the Admiralty. The question of weeding has not yet become urgent, and steps are being taken to secure a proper organisation of the archives.

The office at South Kensington contains a museum and scientific library accessible to students, in connexion with which a leaflet of rules and information has been printed ; and a considerable number of publications are issued through the Stationery Office.

Office of Works.—Reported—the following letter (1665/009) :—

H.M. Office of Works, &c.,
Storey's Gate, Westminster, S.W.
16th April, 1914.

SIR,

I AM desired by Lord Beauchamp to inform you that, with a portion of the profit arising from the sale of seats to view the Coronation Processions in June, 1911, he has endowed a bed at St. Thomas's Hospital for the use of Civil Servants. The very small balance will be invested with the object of assisting Civil Servants to obtain the advantages of a short stay in a convalescent home.

It will be readily understood that the scope of this assistance is extremely limited, but Lord Beauchamp hopes that it may prove helpful to members of the Civil Service, particularly the junior grades, upon whom illness and the subsequent period of convalescence place a somewhat severe financial strain. He has appointed a small Committee to advise him as to the cases for nomination to the hospital bed and for convalescent treatment, and he would be glad if you would be so good as to cause the officers of your department to be informed of the existence of these arrangements.

All applications should be made, through the head of the department, to the Hon. Secretary to the Committee, Mr. Ernest H. Bright, M.V.O., H.M. Office of Works.

I am, &c.,
LIONEL EARLE.

The Director,
Meteorological Office.

Forecasts.—*Mr. Mallock's letter to "Nature."*—The Director reported—that a letter by Mr. A. Mallock, F.R.S., had appeared in the issue of "Nature" for February 26th, giving discouraging results of a year of the Office morning forecasts as checked for one district by the 7 a.m. map, with weather grouped into four types according to wind direction only, and promising a second letter, designed to prove that successful forecasts for the temperate regions for so long as 24 hours in advance are not possible.

It was agreed that in view of the inadequacy of the method employed by Mr. Mallock for testing the forecasts, a formal reply might be authorised in case the promised demonstration of impossibility did not appear sufficiently conclusive to justify the reconsideration of the Office practice with regard to the issue of forecasts.

459. NINTH ANNUAL REPORT.—It was agreed to prepare a Ninth Annual Report of the Committee to the Lords Commissioners of His Majesty's Treasury, on the same lines as last year. Manuscript of part of the Report was laid on the table.

460. ESTIMATES FOR 1914–15.—*Forecasts by Telephone.*—A draft reply to the letter from the Treasury, printed in Minute 450, was submitted and approved in the following form :—

FORECASTS BY TELEPHONE.

13th May, 1914.

SIR,

I AM instructed by the Meteorological Committee to advert to your letter of the 6th February (24.831/13), and to ask you to put before Their Lordships the considerations which led them to suggest that a subscriber to the Telephone Exchange should be allowed to receive a forecast in reply to an inquiry by telephone at a fee of 3*d.*, and which seem to them to justify the Committee in asking Their Lordships to modify Their opinion that in the first instance the fee for the service should be fixed at 6*d*

2. The first consideration is that in order that the service which the Committee have in view may be effective, it must develop into the practice of a daily service to those subscribers who are interested in getting the information with the greatest promptitude. The Committee do not think that much good will result from the occasional call of the casual subscriber.

3. The Committee fixed upon 3*d.* as being probably the largest sum which the public would think unimportant. The fee of 6*d.* would, in their opinion, frequently lead to some questioning as to whether the Office ought or ought not to make a charge for information which is public property. It is obtained in the first instance by public money, and can be got for a copper in the newspaper, with some other useful information as well, and it will appear churlish on the part of the Office to demand silver for the information by telephone. The Committee admit that if the case were argued the fee would be justified, but the staff necessary to conduct a successful argument with individual subscribers over the telephone is more expensive than that which the Committee propose to employ for this service.

4. But when the organization is once set up it will become handsomely profitable at 3*d.* if the necessary staff can be kept fully occupied in the service. The Committee estimate that they will cover the expenses of a line at 30 calls a day at 3*d.* : the staff that can deal with 30 calls could easily deal with 60. They think it more likely that they will get 30 calls at 3*d.* than 15 calls at 6*d.*

5. The Committee's object is to make the service popular. The criticism which the Committee are disposed to make of the existing arrangements for distributing forecasts is that they are apt to fail in that respect. If the issue was once established on a popular basis, they do not doubt that it would be possible to raise the price to make it lucrative, if experience should prove that the public are taking advantage of the lower price. A demand would have been created which would persist in spite of an increased price.

6. They would point out the service ought to be a fairly extensive one or it will not be worth the trouble of organisation.

They therefore beg leave to ask that they may be allowed in this instance to vary the usual practice and begin with the lower figure of 3*d*.

I am, &c.,
W. N. SHAW.

The Secretary,
H. M. Treasury,
Whitehall,
London, S.W.

461. ACCOUNTS FOR 1913–14.—**Scottish Meteorological Society.**—Submitted—the following account, for 1913–14, of expenditure of the Grant to the Scottish Meteorological Society prepared by the Hononary Treasurer of the Society, in accordance with Regulation 4 for the Meteorological Office, Edinburgh (Minute 393).

In addition to the Office grant of £350, a sum of £51 13*s*. has been paid to the Superintendent of the Edinburgh Office for the travelling expenses of an inspection tour, and of two visits to the Central Office during 1913–14.

STATEMENT OF ACCOUNT OF SCOTTISH METEOROLOGICAL SOCIETY WITH THE METEOROLOGICAL COMMITTEE FOR YEAR ENDING 31ST MARCH, 1914.

Receipts.

	£
From the Meteorological Committee ...	350
On account of Reports supplied to the Registrar-General for Scotland	100
	450

Expenditure.

	£ s. d.	£ s. d.
1. *Salaries:*—		
Superintendent ...	250 0 0	
Assistant	104 2 7	
Occasional assistance	7 15 0	
		361 17 7
Workmen's Compensation Insurance ...		0 10 9
National Health Insurance		1 3 6
2. *Furniture and Fittings*		8 9 4
3. *Binding Schedules and Official Reports* ...		4 17 6
4. *Stationery and Postages:*—		
Supply of Schedules and Notebooks for nine months, April —December, 1913	6 0 0	
Stamps to Observers —nine months ...	1 15 0	
Postages repaid M.O. for 1914	3 1 2	
Correspondence, say	1 5 2	
		12 1 4
		389 0 0
Balance carried forward		61 0 0
		450 0 0

WILLIAM B. WILSON,
Honorary Treasurer.

Approved.

Audit of stock of instruments at the Central Office.—Reported—that in accordance with Minute 168, Dr. Chree has inspected and certified the stock of instruments in the Office on 31st March, 1914 (1492/400).

462. OFFICE AND OBSERVATORY STAFF.—It was agreed that in order to obviate numerous changes in the Salary list in the course of the year caused by appointments with fixed annual increments which do not date from 1st April, the salary for the whole year, inclusive of the increase for the concluding portion, be distributed equally over the twelve months beginning with April.

463. OFFICE PREMISES.—**Storage of lithographic stones, &c.**—Owing to a large increase in the number of lithographic stones required by the M.O. press, the question of storage accommodation for them has arisen. The accommodation for printing paper and bicycles is also connected with the question.

It is suggested that the stocks of Daily, Weekly and Monthly Reports, of envelopes and of the records of sunshine now in the basement might be stored elsewhere in order to provide a printers' store room.

The Director was asked to report further upon the matter.

464. OBSERVATORIES.—**Eskdale.**—*Milne Seismograph.*—Reported—that at the request of Prof. H. H. Turner, Chairman of the British Association Committee for Seismology, a report on the seismographs at Eskdale had been drawn up and communicated to him, pointing out in particular the advantages of the Galitzin recorders over the Milne recorder, and suggesting various improvements to the latter, which are the standard type of seismograph of the British Association, in order to render their records suitable for the application of the methods of computation which are now applied to the Galitzin records.

Reported further—that in a letter dated 7th April, 1914 (1601/CE. 90), Prof. Turner suggested that the Milne recorder should be discontinued, provided the Galitzin records could be sent to the Earthquake Observatory at Shide instead of the Milne records. With the concurrence of Captain Lyons, Chairman of the Gassiot Committee, instructions were given on 14th April to discontinue the Milne recorder if the Superintendent of the Observatory agreed.

Motor Car (Minutes 395,404).—Reported—the receipt from the Superintendent of Eskdale Observatory of a statement (1578/CE. 50) of the cost of running the Motor Car for the past eight months :—

	£	*s.*	*d.*
Proportion of fixed annual charges	8	3	4
Petrol	4	15	4
Oil, Grease, &c.	1	3	5
Repairs	12	13	3
	£26	15	4

The total run was 1172·8 miles, of which 617·4 miles were on official business. The cost of running works out at 5·48 pence per mile exclusive of driver's time, depreciation, and the cost of time spent in repairs by the staff.

Valencia.—*Repairs.*—Reported—that the Superintendent of Valencia observatory had reported on 30th March that the repairs authorised by Minute 426 had been completed, and were satisfactory, except that the leaks in the chimney stack still remained. The Contractor had been informed of the defect. In the meantime a payment of £50 on account has been made to the Contractor.

465. PRESENTATION OF PUBLICATIONS.—**University of Hong Kong.**—It was agreed that the Geophysical Memoirs should be presented to the new University of Hong Kong, the Librarian of which had asked for Office publications.

466. DIRECTOR'S REPORT AND ACCOUNTS :—

Publications.—Copies of the "Seaman's Handbook of Meteorology" and "Instructions for Meteorological Telegraphy," 1914 Edition, to come into use on May 1st, are laid on the table.

Reports of Work (March, 1914).—0. *Administration Division.*—Library, Réseau Mondial and Technical Inquiries Division.

Library.—Current work. Authors' cards prepared for 76 new volumes. 115 Subject cards prepared. 104 books borrowed by Office Staff. Book plates placed in 277 volumes.

The alteration of the shelf mark in Catalogue, Authors' cards and Subject cards completed for all books in Bay I.

Number of Publications received :—

(*a*) Annual	27
(*b*) Quarterly	8
(*c*) Monthly, including monthly packets of Daily Weather Reports	141
(*d*) Weekly, „ weekly „ „ „	97
(*e*) Reports received daily	500
(*f*) Occasional publications	13
(*g*) New books and pamphlets	17
	803

Inquiries :—	Personal.	Letter.
1. Newspapers	7	—
2. Legal	4	13
3. Scientific and Commercial	18	42
4. Forecasts	3	—
5. General	1	—
	33	55

Receipts for Inquiries :—	£	*s.*	*d.*
Personal	0	4	9
By letter	6	3	6
	£6	8	3

Foreign and Colonial Returns.—Current work.

168 MS. documents received and registered.

Arrears of checking and casting returns for Malden Island, Fanning Island, Grytviken (Cumberland Bay) and stations in the Gold Coast Colony.

Preparation, for issue to recipients, of copies of Colonial Observations from Blue Books for 1912, in accordance with the following list :—

OBSERVATIONS FROM BRITISH COLONIES, 1912.

List of reprints from Colonial "blue books."

International Geographical Class Letters.		
dg	Gibraltar	Monthly and Annual Summaries.
dm	Cyprus	Monthly and Annual Summaries for 6 Stations.
dm	Malta	Monthly and Annual Summaries for 7 Stations.
eb	Hong Kong	Daily Readings and Monthly and Annual Summaries.
eg	Straits Settlements ...	Monthly and Annual Summaries for 5 Stations with a Monthly Rainfall for a number of Stations.
fd	Accra	Monthly and Annual Summaries.
fd	Freetown, Sierra Leone ...	Monthly and Annual Summaries with Daily Readings of barometer.
fd	Gambia	Monthly and Annual Summaries with Daily Readings for Bathurst.
fd	Northern Nigeria	Monthly and Annual Summaries for 19 Stations with Daily Readings for Zungeru and Lokoja.
fd	Southern Nigeria	Monthly and Annual Summaries for 33 Stations.
ff	Nyasaland	Monthly and Annual Summaries with Daily Readings for Zomba.
hb	Belize (British Honduras)	Monthly and Annual Summaries.
hc	Antigua	Monthly and Annual Summaries with monthly rainfall at various Stations.
hc	Barbados	Daily Readings with Monthly and Annual Summaries.
hc	Bermuda	Daily Readings.
hc	Grenada	Daily Readings with Monthly and Annual Summaries.
hc	Jamaica	Daily Readings at Kingston with Monthly and Annual Summaries for 2 Stations.
hc	Nassau	Monthly and Annual Summaries.
hc	St. Lucia	Monthly and Annual Summaries with monthly rainfall at a number of Stations.
hc	St. Vincent...	Monthly and Annual Summaries.
hd	Trinidad and Tobago ...	Daily Readings with Monthly and Annual Summaries and Monthly and Annual Rainfall at a number of Stations and Daily Sunshine for 1 Station.
hd	Georgetown	Daily Readings and Monthly and Annual Summaries.
mb	Mauritius	Daily Readings with Monthly and Annual Summaries.
mb	Seychelles	Daily Readings with Monthly and Annual Summaries.
nf	Fiji	Daily Readings with Monthly and Annual Summaries.

Réseau Mondial.—Preparation of Tables for British and Colonial stations for January, 1911, completed.

Lustrum Forms prepared or commenced for Gibraltar, Cape Spartel, Sierra Leone, Bathurst, Accra, Cape Coast Castle, Lagos, Bermuda, Nassau (Bahamas), Georgetown, St. Helena, Port Moresby, Suva (Fiji), Christmas Island, Malden Island.

Miscellaneous.—Setting and marking papers in Arithmetic, Elementary Mathematics, and Geography in examination held on March 17th.

Inquiry Assistants.—Miss Powell : Preparation of humidity Tables. Examination of final proof of "International Meeting at Rome" and preparing Index. Revising proofs of Geophysical Memoir, No. 9 ; Circular No. 001 (A—H and J). Attendance at Kew Observatory on 11 days at work on Library.

Miss Smith : Preparing information for replies to various Inquiries. Work on returns from Gold Coast Stations for 1909–1911 ; St. Helena, July—December, 1913 ; Suva, January, 1914 ; Ocean Island, December, 1913 ; Cape Spartel, January and February, 1914.

Miss Turney : Preparation of litho. transfers for Monthly Weather Report. Roll Calendar for April. Lantern slides for Captain Hepworth, Mr. Lempfert, Dr. Chree. Making copies of anemogram curves. Additions to Rainfall diagram and diagrams for Captain Hepworth, &c.

Publications.—Report for March, 1914, from Clerk of Publications :—

—	March.	
	Received.	Issued.
Daily Weather Report	900	870
Weekly Weather Report	375	344
Monthly Weather Report, &c.	600 (Jan.) 600 (Feb).	506 (Jan.) 506 (Feb.)
Do. Do. (Maps)	25 „ 25 „	2 „ 2 „
Daily Readings	—	—
Geophysical Journal, 1913	—	—
Hourly Values.—Meteorological, 1913 :—Kew ...	—	—
Eskdale ...	—	—
Valencia	—	—
Do. —Geophysical	—	—
Monthly Meteorological Charts (Atlantic)	600 monthly (to April 3)	583
Do. Do. (Indian)	350 (April)	285
International Upper Air Observations, 1912 ...	50 (Jan. and Feb.)	31 (Jan. and Feb.)
Eighth Annual Report...	—	2
Observer's Handbook (1913)	—	20
Forecasting Weather"	—	—
Cloud Atlas	—	3
Report—Commission for Weather Telegraphy ...	—	1
Do. do. Maritime Meteorology ...	—	—
Codes of Signals, 1913...	—	—
Calendar, 1914	—	1
Structure of the Atmosphere...	—	1
Geophysical Memoirs, No. 1	—	2
No. 2	—	2
No. 3	—	2
No. 4	—	2
No. 5	—	4
No. 6	—	4
No. 7	—	3

Receipts from sales at M.O.—£3 4*s.* 5*d.*

New Publications.—The Seamen's Handbook of Meteorology, Rome Report, Circular 001 (A–H and J) and Geophysical Memoirs 8, 9, and 10 are in the press.

M.O. Press.—During the month of March, 1914, the issue of the periodical publications has been as follows: Daily Weather Report, maps for the Weekly Weather Report, maps for the Monthly Weather Report, Monthly Meteorological Charts of the North Atlantic, Monthly Meteorological Charts of the Indian Ocean, as contract.

On 1st March there were four requisitions outstanding. During the month three requisitions have been issued and two discharged, leaving five still on hand, including two for Plates for Geophysical Memoirs Nos. 9 and 10.

1. *Marine Division* (March, 1914).—Logs and Registers.—Dealt with on receipt 26 Meteorological Logs and 1 Lighthouse Register; also 113 North Atlantic Registers, 72 Radio-telegraphy Registers, and 9 Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic.—The Chart for April, 1914, published; and the Chart for May, 1914, in course of preparation.

Collating and charting Monthly Salinity and Sea Surface Temperature observations in the North Atlantic in connexion with investigations being carried out by the Fishery Branch of the Board of Agriculture and Fisheries.

Monthly Meteorological Charts of the Indian Ocean.—The Chart for May, 1914, corrected revise passed for press on the 30th, in course of publication; the Chart for June, 1914, now in course of preparation.

Monthly Meteorological Charts of Davis Strait and Baffin Bay.—Preparation of data for use in the construction of wind-roses. Drawing wind-roses, isobars, and air and sea isotherms. Preparing Charts of ice distribution.

Extraction of Observations relating to China Sea.—20 logs.

Reports of Ice.—Four reports sent to "Shipping Gazette."

Corrections for Barometers obtained in connection with—(1) Reports by Radio-telegraphy, 55. (2) North Atlantic Registers, 1.

Observational Duties.—Time occupied 34 hours.

Extraction of Observations relating to selected Areas for Dutch Meteorological Institute.—Sixth collation of extracts. Time occupied 30 hours.

Indexing Data in Ocean 10° squares.

Obtaining and Preparing Information for Solicitors in connexion with—(1) Cape Pembroke, 3 hours; (2) Mediterranean and Bay of Biscay, 8 hours; (3) Trans-Atlantic weather, 8 hours.

2. *Forecast Division* (Central Office, March).—(1) Current work on Daily, Weekly, and Monthly Weather Reports and on Atlantic Charts, up to date.

(2) Number of Wireless Reports received from—(1) H.M. Ships, 7 ; (2) Mercantile Marine, 485.

(3) Corrections to Daily Weather Report for February prepared.

(4) Wind frequency results extracted to end of December. Checked for all stations to end of June, and for 5 stations to end of December.

(5) Working Charts prepared for binding up to end of 1913.

(6) Checking of 8.30 p.m. forecasts completed up to end of 1913.

(7) Storm Warning checking completed :—

Anemometer results to end of February.
English lighthouses to end of January.
English lightships to middle of January.
Scottish lighthouses to end of January.
Irish lighthouses to end of January.

(8) Inquiries :—

Prepaid replies	12
Other telegraphic inquiries	3
Telephone inquiries	10
Personal	1

(9) Serial forecasts sent to 22 persons or authorities, including—

(*a*) On behalf of the *Admiralty* to 6 Aviation stations daily.
(*b*) On behalf of the *War Office* to 5 Aviation stations daily for the information of the Officers of the Royal Flying Corps.
(*c*) Since March 21st to the Assistant-in-Charge, Falmouth Observatory.

(10) Admiralty forecasts—

(*a*) 3 Dockyards (daily).
(*b*) H.M. Ships within range of Wireless Telegraphy (twice daily).
(*c*) Aircraft Report for transmission by Wireless Telegraphy to Aviation stations.
(*d*) Report for transmission by Wireless Telegraphy to Gibraltar giving forecast of wind in Bay of Biscay and on Iberian coast.

New Units.—Preliminary arrangements made for substitution of millibars for inches in readings of barometer and suitable corrections prepared for Telegraphic Forecast stations. We still await the cards.

(Branch Office at Farnborough, March).—Normal telegraphic observations have been taken at 7h., 13h., and 18h. daily throughout the month.

The preparation of the evening map and forecast has also been continued regularly.

13 single theodolite pilot ballon ascents have been made.

Some further consideration has been devoted to the question of the relationship of surface to gradient winds.

Slight improvements have been fitted to one of the self-recording theodolites.

Certain corrections have been made to the "Calculus of the Upper Air" to be incorporated in the "Computer's Handbook."

Some observations have been made with a view to determining the accuracy obtainable in reading a station barometer with good illumination, and also upon the accuracy of a barograph of double the natural mercury scale.

The 98 foot anemometer at Pyrton Hill has been dismounted.

The ordinary analysis work has been kept up to date.

Mr. Billet has devoted his time mainly to assisting in the above work including the occasional preparation of the evening forecast. He has also continued his experiments on the "Tetranemograph" and commenced the preparation of an abstract of the work "Aeronautische Meteorologie" by Fischli.

(Falmouth Observatory, March).—Routine Work.—Monthly Return (Form 355) completed and checked for February. March nearly ready.

Tabulation of

Barograms (Form 402) from January 12 to March 31st completed.
Hourly Values of Rainfall (Form 410) completed to March 31st.
Hourly Values of Sunshine (Form 403) completed to March 31st.
Falmouth Robinson Anemograms (Form 401) completed for February. March in hand.
Scilly Robinson Anemograms (Form 401) completed for February. March in hand.
Falmouth Record of Wind Direction (Form 224) completed for February.
Scilly Record of Wind Direction (Form 224) completed for February.

Analysis of

Pendennis Pressure Tube Anemograms (Form 339) up to date.
Scilly Pressure Tube Anemograms (Form 339) up to date.
Plymouth Pressure Tube Anemograms (Form 339) from March 16th.

No Balloon ascents. Daily, Weekly, and Monthly reports to the Press, and to various authorities—County Council, &c.

3. *Statistical Division* (March, 1914).—British Meteorological Year Book, 1912-1913.

Part I.—Weekly Weather Report.—Current issues (Nos. 8, 9, 10, 11).
Appendix I., 1913, completed.
Appendix II., ready for printer.
Appendix III., in hand.

Part II.—Monthly Weather Report.—February issued 30th March.

Part III.—(1) Daily Readings.—None issued (waiting for pressure values for Aberdeen).
(2) Geophysical Journal.—None issued (waiting to settle Upper Air results).
Registrar-General's Annual Report, 1912.—Proof read and returned for press.

Part IV.—(1) Hourly Readings :—
Valencia.—March, 1913, signed for press; April, copy sent to printer; May, copy in hand.
Kew.—February, 1913, proof received, corrected, and sent to Kew for observation; April, copy sent to printer; May, in hand.
Eskdalemuir.—February, 1913, proof received; March, copy sent to printer; April in hand.
Aberdeen } Hourly Values, 1913, ready to be passed through the Burrough's
Falmouth } machine.
(2) Hourly Values, Geophysical.—pp. 33 to 40 signed for press; pp. 41 to 64, revise received and corrected; pp. 65 to 81 proof received and read.

Anemograms.—Pressure-tube anemograms from 13 stations analysed, and from 5 stations tabulated, up to 29th March, 1914. In addition to these, 5 stations are summarised by Mr. Dines, 3 stations are summarised at Falmouth, and the Eskdalemuir records are summarised and tabulated at the Observatory.

Robinson cup anemograms from 5 stations tabulated up to 29th March. Besides these, 3 stations are tabulated at Falmouth.

Sunshine Cards.—The cards from 76 stations were examined.

A selection of 5 cards from each station has been re-measured, and returned with a comparison of the Meteorological Office and the observer's estimate of duration.

Cards from 123 stations examined and filed in the Office.

Aneroidograms.—(Form 531) from 29 stations filed up to date; (Form 533) from 15 stations filed up to date.

Thermograms.—(Form 542) from 1 station, (Forms 547, 548) from 6 stations, and (Form 549) from 1 station, filed up to date.

Miscellaneous.—Rain curves and Hyetograms from 7 stations; Microbarograms from 2 stations, Radio-grams from 1 station, and Hygrograms from 3 stations, filed up to date.

Rainfall returns from 87 stations entered on Form 372.

Absent.—Mr. Gold (½ day) inspecting proposed site for a station at Tunbridge Wells; H. W. Hewitt, 1 day's vacation.

4. *Instruments Division* (March, 1914).—Marine work.—Six ships have received supplies from the Office. Three sea temperature stations have been supplied with new instruments; also one storm-warning cone.

Telegraphic stations.—Two barometers graduated in inches and baromils have been issued to stations and one to the M.O. Forecast Division. 23 stations were supplied with new raingauge measures graduated in millimetres. A new thermometer screen with oak stand has been installed in the grounds of the Natural History Museum.

Observatories and anemograph stations.—A balloon Theodolite has been sent to Aberdeen in lieu of one returned defective, also a small Theodolite and a Fineman Nephoscope to Eskdalemuir.

A brass ring for testing Magnetographs at Eskdale has been graduated in degrees.

A half-horse power gas engine and dynamo has been fitted up at Kew Observatory.

Seven requisitions from private individuals and corporations have been met. Seven consignments have been sent to the colonies.

A Dines anemometer for the India Office is about to be despatched.

Large indents for Commonwealth of Australia and South Africa are still in hand.

Observatories.—Kew (March, 1914).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office. The following absolute observations have been made :—

Magnetic	Declination	4	
	Inclination	4	
	Horizontal force...	4	
Potential gradient	on	13	days.
Wilson apparatus	„	9	„
Ebert „	„	7	„
Pyrheliometer (solar intensity)	„	4	„

International cloud observations were made on three days.

Scale value determinations have been made of the electrograph and seismograph.

Scale value determinations have been made of the horizontal and vertical force magnetographs, and their sensitiveness was increased.

The vertical force magnet constructed by Adie for Toronto has been under test. It has been found that the temperature compensation supplied is inadequate.

A dip circle with four needles, by Dover, has been tested and supplied to Prof. Melander of Helsingfors.

Photographic paper has been supplied to Oxford Observatory.

The makers have been engaged in fitting up an engine and dynamo in the "workshop."

The erection of the new fence and alterations to the grounds have been commenced.

Miss Powell, with Miss Corrin's assistance, has been engaged in arranging the books.

Mr. Stewart has been at Eskdalemuir during the greater part of the month.

Eskdale (March, 1914).—Staff.—Mr. Stewart arrived on the evening of the 11th and took up duty at once. There have been hardly any holidays. A statement of the division of ordinary duties has recently been forwarded.

Grounds and Buildings.—The planting of the trees is approaching completion.

The means for combating a possible outbreak of fire have been discussed by the staff and the three types of fire extinguishers have been tested.

The underground is in much the same state as during the winter. The heights of the standard barometer and raingauge above the bench mark on Davington schoolhouse have been re-surveyed by Messrs. Skelton, Beck and myself.

Magnetics.—Absolute observations have been made weekly as usual, the dip being taken by the inductor and frequently by the dip circle as well.

The state of the tabulations is as follows :—

——	N.	W.	V.
Read once	To date	To date	August 1st to December 3rd.
Read twice	"	"	" "
Converted to γ	December 31st	December 31st	Not yet.
P & Q	September 30th	September 30th	—
Final base assigned	July 31st	July 31st	—
G.J. data	"	"	—
Monthly sheets (unchecked) ...	May 31st	March 31st	Not yet.

The thermometers used in the vibration and deflection experiments have been compared.

The additional correction for bending due to the new position of the thermometer has been go out by Mr. Stewart from Dr. Chree's paper.

A thorough investigation of azimuths in the underground is being undertaken by Mr. Stewart with some help from Mr. Harris and myself. The theodolite, which has recently arrived from the Office, has greatly facilitated this work.

The scale values have been brought up to date.

Meteorology.—The climatological and telegraphic work has been continued as usual. A comparison between the two thermometer screens has been begun.

Mr. Laidlaw has been making estimates of wind on the Beaufort scale.

The pyrheliometer station has been moved from the top of the tower to a much more convenient situation on the first floor and readings are being obtained between 11h and 13h on days when the sun is unclouded.

Pilot ballooning has been continued. Two sounding balloons have been sent up.

Seismology.—The Milne, Omori and Galitzins are running. The tabulations are in the following state :—

Galitzin ... ... End of July.
Data for Shide ... ... September 30th.

A considerable amount of Mr. Dines's time is being spent in preparing microseismic data for the International Association.

Atmospheric Electricity.—Two absolute observations of potential gradient have been made. The curves have been read up to date.

Wireless.—Data are being collected for the B.A. Radiotelegraphic Committee on the strength of signals, by Mr. Skelton.

Accounts.—Submitted—The following statement of the Bank Account in the Cash Book :—

	£	s.	d.
Bank balance on 28th February, 1914	2,215	11	6
Receipts from 1st March to 28th April, 1914	7,826	11	3
	10,042	2	9
Cheques drawn from 1st March to 28th April, 1914	3,696	18	2
Bank balance on 28th April, 1914	6,345	4	7

Submitted—The following Statement of Accounts for the Year ending 31st March, 1914:—

Receipts.					Payments.			
1912-13. £ s. d.		£ s. d.	1913-14. £ s. d.		1912-13. £ s. d.		£ s. d.	1913-14. £ s. d.
404 6 4	Balance from year 1912-13	—	95 17 9		1,000 0 0	Director...	—	1,000 0 0
17,000 0 0	Parliamentary vote .	—	20,000 0 0					
	M.O. Observatories:					Office Salaries (including Insurance):		
					7,739 10 6	Monthly	8,225 5 2	
1,032 7 4	Kew	780 15 5			905 10 3	Weekly	1,006 3 10	
1,348 7 5	Eskdalemuir ...	1,302 15 4						9,231 9 0
65 2 11	Valencia	36 8 4				M.O. Observatories:		
400 0 0	Farnborough ...	254 11 8			1,625 16 9	Kew	1,951 1 9	
109 9 6	Sales of Forms, &c.	107 10 1			1,406 5 1	Eskdalemuir	1,881 15 4	
			2,482 0 10		539 11 0	Valencia	571 5 9	
	Departmental Expenses Repaid:				366 13 1	Farnborough	497 10 5	
163 2 3	Forecasts, &c. ...	159 2 11						4,901 13 3
	Marine, Statistics, and Observa-					Office Expenses:		
104 19 1	tories	127 15 11			700 0 11	Rent, Fuel, &c. ...	—	689 0 7
163 2 2	Instruments ...	164 19 3			319 11 11	Furniture, Fittings, &c. 320 19 3		
			451 18 1		—	Less refund 186 11 6		
							134 7 9	
	Incidental Expenses Repaid:				377 8 3	Incidental Expenses...	496 8 3	
445 0 6	Forecasts, &c. ...	492 18 10						630 16 0
76 4 10	Other Branches ...	126 18 7				Postage:		
	Stationery Office				297 8 11	General Postage ...	313 9 0	
50 11 2	Account ...	57 16 9				Postage of Daily		
			677 14 2		369 14 11	Weather Reports ...	414 0 2	
								727 9 2
	Telegraph Charges Repaid:				2,602 10 10	Telegrams, &c. ...	—	2,681 13 11
216 3 2	Home	361 1 6						
	Telegrams sent				308 17 6	Travelling Expenses (Inspections, &c.)	—	444 19 4
388 19 3	abroad	452 4 2						
			813 5 8			Superannuation:		
					715 0 0	Funded annuities ...	821 0 0	
	Instruments:					Non-funded pensions		
742 2 10	Royal Navy ...	912 5 7			652 8 3	and fund	1,160 7 10	
	Mercantile Marine,							1,981 7 10
2,600 0 9	Stations, &c. ...	2,658 4 2				Cost of Instruments:		
			3,570 9 9		738 12 6	Royal Navy	912 5 7	
						Mercantile Marine,		
156 12 5	Inspections ...	—	210 13 0		3,236 11 7	Stations, &c. ...	2,484 0 5	
								3,396 6 0
	Superannuation Account:					Auxiliary Observatories, &c. ...		
					2,246 14 8		2,287 3 9	
715 0 0	Annuities... ...	794 9 3				Lectures and Experi-		
	Interest on Invest-							
52 19 4	ment	29 8 0			350 0 0	ments	157 4 4	
	Income Tax re-							2,444 8 1
8 15 0	turned	—						
			823 17 3			Balance:		
					47 16 8	Cash at Bank... ...	1,204 1 2	
	Lectures and Experiments ...				48 1 1		46 15 6	
345 18 5		—	254 3 4			,, at Office ...		
								1,250 16 8
£26,594 4 8			£29,379 19 10		£26,594 4 8			£29,379 19 10

Liabilities.				Assets.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
1,748 8 11	To sundry creditors	2,564 2 11		95 17 9	By cash at Bank and at Office ...	1,250 16 8	
—	,, balance	14 11 2		11 7 9	,, salaries reserved	9 14 5	
				299 8 11	,, M.O. instruments in stock	420 19 5	
				1,272 12 11	,, sundry debtors	897 3 7	
				69 1 7	,, balance	—	
£1,748 8 11		£2,578 14 1		£1,748 8 11		£2,578 14 1	

Note.—On 31st March the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £1,380 5*s.* 11*d.*

Observatories.—Statement of Accounts for the Year ended 31st March, 1914 :—

KEW.

1912–13.	*Receipts.*	1913–14.
£ s. d.		£ s. d.
685 1 1	Gassiot Trust	449 15 3
281 5 0	National Physical Laboratory ...	103 2 8
—	Scott Antarctic Fund	82 0 0
5 0 0	Grazing Rents	5 0 0
61 1 3	Miscellaneous	140 17 6
593 9 5	To Balance	1,170 6 4
£1,625 16 9		£1,951 1 9

1912–13.	*Payments.*	1913–14.
£ s. d.		£ s. d.
656 10 10	Superintendent	656 10 10
417 6 7	Assistants	590 15 10
99 19 5	Caretaker	98 8 8
15 3 8	Sundays and holidays	17 7 5
102 13 4	Overtime	51 17 0
89 6 10	Rent, fuel, and lighting	90 0 8
28 7 1	Repairs, furniture, &c.	176 1 0
7 2 9	Insurance	9 19 0
56 12 5	Materials	31 12 5
92 18 5	Instruments	128 11 7
5 11 0	Books, printing, and stationery ...	6 18 0
54 4 5	Incidental expenses ...	92 19 4
£1,625 16 9		£1,951 1 9

ESKDALE.

1912–13.		1913–14.
£ s. d.		£ s. d.
1,000 0 0	Royal Society (Parliamentary Grant)	1,000 0 0
302 7 11	Salary of Assistant in Seismology	297 12 1
45 19 6	Miscellaneous	5 3 3
57 17 8	To Balance	579 0 0
£1,406 5 1		£1,881 15 4

1912–13.			1913–14.
£ s. d.		£ s. d.	£ s. d.
366 13 4	Superintendent		373 11 7
492 14 7	Assistants		446 4 2
110 5 7	Mechanic and Caretaker		126 6 0
52 2 6	Handyman		54 13 0
—	Head Servant		30 13 10
20 4 0	Books, stationery, &c. ...		16 15 1
5 19 8	Insurance		23 18 9
16 7 4	Travelling expenses ...		92 5 9
	Incidental expenses :—		
23 15 0	Rental of private wire	25 2 9	
19 5 0	Instruments and repairs	148 4 2	
62 14 0	Photographic paper ...	73 12 10	
132 11 7	Coals including cartage, and light ...	119 8 1	
61 14 4	Repairs, &c.	155 6 0	
36 18 2	Sundry incidental expenses, postages, porterages, &c., paid out of petty cash ...	85 13 4	
—	Purchase of motor car ...	110 0 0	
			717 7 2
£1,406 5 1			£1,881 15 4

VALENCIA.

1912–13.		1913–14.
£ s. d.		£ s. d.
47 12 11	Royal Society (magnetic observations)	18 18 4
17 10 0	Grazing Rent	17 10 0
474 8 1	To Balance	534 17 5
£539 11 0		£571 5 9

1912–13.		1913–14.
£ s. d.		£ s. d.
275 0 0	Superintendent	275 0 0
121 7 2	Assistants	122 5 11
42 0 0	Magnetic observations	27 0 0
23 7 1	Rent, rates, and taxes	10 9 4
—	Repairs, &c.	50 0 0
13 5 0	Private wire	13 7 11
64 11 9	Miscellaneous expenses	73 2 7
£539 11 0		£571 5 9

FARNBOROUGH.

1912–13.		1913–14.
£ s. d.		£ s. d.
400 0 0	Advisory Committee	250 0 0
—	War Office	4 11 8
—	To Balance	242 18 9
£400 0 0		£497 10 5

1912–13.		1913–14.
£ s. d.		£ s. d.
225 0 0	Meteorologist	250 0 0
—	Assistant	107 1 4
141 13 1	Other Expenses (including Laboratory Assistant)	140 9 1
33 6 11	By Balance	—
£400 0 0		£497 10 5

FIFTY-SIXTH MEETING.

South Kensington, S.W., 24th June, 1914.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

CAPT. LYONS. | DR. SCHUSTER.

467. The Minutes (457–466) of the last Meeting (29th April, 1914) previously circulated were taken as read, and confirmed.

With regard to the question of the storage of lithographic stones in the basement of the Office (Minute 463), it was agreed to make inquiry whether aluminium plates could not be used instead of stone, thus economising storage space.

468. CORRESPONDENCE.—**H.M. Treasury.**—*Signature of Cheques* (Minute 458).—Read—Treasury letter 10173/14 of 25th May, 1914, and enclosure :—

Treasury Chambers,
25th May, 1914.

SIR,

WITH reference to your letter of the 14th instant, respecting the question of the signing of cheques drawn on the public account of the Meteorological Office at the Bank of England, Western Branch, I am directed by the Lords Commissioners of His Majesty's Treasury to transmit herewith for your information copy of a letter of to-day's date which They have caused to be addressed to the Bank of England on the subject.

I am to add that cheques will only be signed by Captain Lyons in the absence from the office of either the Director or the Secretary to the Director.

I am, &c.,
T. L. HEATH.

The Director
Meteorological Office.

Treasury Chambers,
25th May, 1914.

GENTLEMEN,

I AM directed by the Lords Commissioners of His Majesty's Treasury to inform you that for the future cheques drawn upon the Public Account of the Meteorological Committee, opened in the books of your Western Branch in accordance with Treasury letter 7070/05 of 12th April, 1905, will be signed by any two of the following officers :—

Mr. W. N. Shaw, Sc.D., F.R.S., &c., Director.
Captain H. G. Lyons, F.R.S., &c.
Mr. Richard Corless, M.A., Secretary to the Director.

A specimen of Mr. Corless' signature (in duplicate) is enclosed, and My Lords will be glad if the necessary notification can be made to the London County and Westminster Bank, Brompton Square.

I am, &c.,
T. L. HEATH.

The Governor and Deputy Governor,
Bank of England.

Instructions have been given accordingly.

Charges for Forecasts by Telephone.—Reported—Treasury letter 10114/14 of 5th June, in reply to the Committee's letter printed in Minute 460 :—

Treasury Chambers,
5th June, 1914.

SIR,

IN reply to your letter of the 13th ultimo (615/C.06), I am directed by the Lords Commissioners of His Majesty's Treasury to state that, in deference to the further representations of the Meteorological Committee, They now consent to the proposal that the fee payable for the supply of a forecast by telephone should be fixed, in the first instance at all events, at 3*d.* instead of 6*d.*

I am, &c.,
JOHN BRADBURY.

The Director,
Meteorological Office,
South Kensington.

Board of Trade.—*International Organisation of a Meteorological Radiotelegraph Service.*—Read—the following correspondence with the Marine Department of the Board of Trade :—

M.O. 2527.

Board of Trade (Marine Department),
7, Whitehall Gardens, London, S.W.,
3rd June, 1914.

SIR,

I AM directed by the Board of Trade to call your attention to the terms of the following recommendation, which was made by the International Conference on Safety of Life at Sea. (Parliamentary Paper Cd. 7246, page 121).

"14. In support of the recommendations of the International Time Conference held at Paris in 1912 :—

(1) A Radiotelegraph meteorology service should be established conformably to the provisions of Article XLV of the regulations appended to the London Radiotelegraph Convention.
(2) Foreign-going sailing and steam ships should be provided with an apparatus for the reception of time and weather signals."

No action has been taken yet with regard to this recommendation, and, as regards the second paragraph, there is no power under the present law to make the provision of a receiving apparatus compulsory.

The Board of Trade would be much obliged if you would be so good as to favour them with your observations upon this recommendation of the Conference.

I am, &c.,
W. F. MARWOOD.

The Director,
Meteorological Office,
South Kensington, S.W.

SIR,

16th June, 1914.

WITH reference to Mr. Marwood's letter of 3rd June, 1914 (M. 14481), I beg leave to reply as follows :—

2. The organisation of a Radio-telegraph Meteorology Service between ships and shore stations has been under consideration in various ways, especially during the past five years and it may be useful if I summarise what has been done.

3. *Radio-telegrams from H.M. Ships.*—In 1907 the Admiralty volunteered to report meteorological observations by wireless from H.M. Ships in suitable positions for the morning and evening weather maps which refer to 7 a.m. or 6 p.m., this Office paying for the transmission of the messages over the land-lines from the wireless receiving stations (Scilly and Malin Head).

4. *Reports from Atlantic Liners.*—In 1909 in conjunction with the Deutsche Seewarte (the German Imperial Hydrographic and Meteorological Institute) a trial was made for five months of a scheme of meteorological reports by wireless from liners of both countries crossing the Atlantic. The observations were at 7 a.m. and 6 p.m. The arrangement was for *each* Institute to pay to the Marconi Company a fixed inclusive sum of £17 10*s.* per month as well as its own costs of telegraphy at Post Office rates from the receiving stations. At the close of the period of experiment the Deutsche Seewarte withdrew from the co-operation and the German ships ceased to report. The reports from British Ships have been continued and are still received to the number of about 5,400 messages a year. Some of the observations are indispensable, many are useful, but a considerable number are too late to be of use and the service requires better organisation from that point of view.

5. *Issue of Weather Information to Ships.*—In 1911 when the Post Office had taken over the shore stations, the arrangement then in operation with the Marconi Company was continued and a scheme for the supply of weather information in reply to inquiries by wireless was set on foot as a paying service of which the charges were to be carried to account of the ships to which they were addressed. The scheme can hardly be said to be operative so far as this Office is concerned; very few inquiries are received.

6. *Weather Messages from the Eiffel Tower and from the Admiralty Stations.*—In 1912 the Eiffel Tower commenced issuing daily messages including time-signals and meteorological reports for the use of ships at sea; and the "Time Conference," held in Paris in October of that year, framed a scheme of regulations for this service. At about the same time the Admiralty asked for daily meteorological notices from this Office, morning and evening, to be sent out by wireless for the use of H.M. Ships in home waters, and these have been sent twice a day since 1st March, 1912, and once a day for about a year previously.

7. *Message to Gibraltar about the Bay of Biscay.*—At the end of 1913 the Harbour Master at Gibraltar, through the Admiralty, asked for messages about the weather in the Bay of Biscay for the use of ships leaving Gibraltar for home, and a daily message is handed to the Admiralty to be forwarded by wireless to Gibraltar. This is probably one of the most useful messages *for ships at sea* as notifying the state of the weather off Ushant and Finisterre.

8. *Wireless Organisation in the United States.*—Experimental arrangements for the transmission by wireless of observations to Washington were begun in the Atlantic and Pacific in 1906 and discontinued in 1907 on account of difficulties in relaying messages which have now probably disappeared.

In 1912, Professor W. L. Moore, Chief of the United States Weather Bureau, addressed a letter to me as President of the International Commission for Weather Telegraphy, an extract from which is printed on pages 35 and 36 of the accompanying Report of Proceedings. It recites what has been done in the United States and makes a proposal for compulsory reports from the Atlantic at Greenwich Noon, to be divided between London and Washington.

9. *International Organisation of the transmission of observations from Ships for the Daily Weather Services of Europe.*—The International Meteorological Committee have left it to me to report further on the prospects of establishing a scheme for transmitting observations from ships on an international basis. A report will be expected at an international conference of Directors of Meteorological Institutes and Observatories which is in contemplation for 1915, probably in Holland.

10. I now come to the establishment of "Radio-telegraphy Meteorology Service," conformably to the provisions of Article XLV of the Regulations appended to the London Radio-telegraphic Conference, as recommended by the International Time Conference at Paris in 1912 and supported by the International Congress on Safety of Life at Sea. I have carefully considered Article XLV with the whole context of the report.

11. Two organisations are indicated by the first two paragraphs of Article XLV which might be, and are at present, separate, but which might be more properly, two different aspects of a single organisation. They are (i) the issue of meteorological information *to* ships at sea, and (ii) the collection of meteorological observations *from* ships at sea for the use of the meteorological services so that the areas charted in the Daily Weather Reports may be extended over the oceans. The information sent out to ships at sea as well as to the general public on land should thus become more effective.

12. The provision indicated in Article XLV for supplying information to ships at sea is on the lines of the present provision of the Post Office, which goes on the principle that the distribution of information about the weather is to be regarded as a matter of private enterprise and paid for accordingly. This attitude seems to have been reduced to absurdity by the actual practice, subsequent or previous of this and other countries. The policy of Article XLV is that the Navigator should ask for any particular information that he wants and pay for it. The policy of the French Government with the Eiffel Tower is not only to distribute information broadcast without any charge to the ships or countries which may benefit by it, but also to think out and select the information that will be useful to the Navigator. The Admiralty adopts the same attitude for H.M. Ships, but of course the information is not restricted to those ships: it is the common property of all who take in the messages. The German Government also, I believe, sends out a message about the North Sea, also gratis. I do not know what the practice is in the United States, but it would be contrary to their habit if the Government of that country waited to be asked for meteorological information and charged a fee to the recipient. It is quite possible that these messages do not altogether meet the wishes of Masters of Ships and it is also more than possible that the Masters of Ships, unaccustomed to deal with meteorological facts and figures in the French or German language, lose part of the advantage that they might gain by associating themselves with the enterprise. It is quite certain that with a great deal of information going about gratis, the Masters are not likely to acquiesce in a scheme involving payment as a matter of course.

13. The provision indicated in Article XLV for the collection of meteorological observations from ships is for a "paid service advice" once daily from ships appointed by the Administrations. At present we have for this Office (by the survival of an arrangement with the Marconi Company and the Ship Owners) advices twice a day, 7 a.m. and 6 p.m., from British Liners, claiming absolute priority so long as the Germans were associated with us and still supposed to have some form of priority about which I do not like to inquire lest I should be thrown back on to the technical rights of the case. No other European country has any arrangement so far as I know. The United States and Japan have some form of understanding with the details of which I am unacquainted.

I do not know the exact footing of a "paid service advice"—it may be a technical term of the international telegraph union, but it seems to be on a different footing from that of an ordinary radio-telegram and may perhaps convey the priority which Professor W. L. Moore says was given by the Conference. I do not know whether our present messages are "paid service advices."

14. We have no wish to disturb the existing arrangement until we can get something which is more effective for the work of the Office in the public interest. We should demur to accepting only one message a day from our ships instead of two unless we could have an arrangement about the hour selected. The hour proposed by Professor W. L. Moore, viz., Greenwich noon (7 a.m. at Washington) is admirably convenient for Washington but not for us.

15. Our present arrangement is too much restricted; we ought to get reports through the Coast stations of France and Spain and to include other ships besides the Atlantic lines. Other lines have offered to supply the reports but arrangements have fallen through on account of conflicting conditions laid down by the Post Office and the Marconi Company.

16. We do not think the message sent out by the Eiffel Tower the most suitable selection of information for British seamen, and whether we should seek a modification of that or urge the initiation of a British message is not yet clear. An effective arrangement would bring the ships into co-operation with the Meteorological Offices. With very little trouble, by taking in the messages on the way to the shore stations, the wireless operator of any ship within range or one of the ship's officers could obtain the material for a weather map for the ship's use to be supplemented afterwards by suitable information sent out from shore.

17. It will readily be understood that careful organisation is necessary in order to secure that British interests as well as general interests are duly regarded, and it is therefore important that we should take a leading part in it. As the organisation of the supply of weather information by the Eiffel Tower has gone to France and the organisation of the ice-investigation has gone to the United States by the recent Convention, this country might reasonably and with advantage to itself shoulder the responsibility of organising for the Daily Weather Service the collection of observations from the ships most of which fly the British Flag.

18. But I do not think it is wise for this Office to move in the matter until it is moved to do so by some Cabinet Minister who has the wish to see the matter through as an official undertaking. Long experience has led me to understand that if I begin to negotiate the matter with the Post Office and the Treasury merely as a departmental question, it makes slow progress. The complete difference

of attitude that supervenes when an institution on an official footing like the German Seewarte, for whom meteorological messages are state messages, comes into the negotiations, is too striking ever to be overlooked in a matter of this kind. I should be very unwilling for the matter to be arranged by Germany instead of ourselves, and as we cannot claim the official position ourselves, the proper and indeed the only course for us seems to be to wait, as I have said, until the matter comes within the sphere of action of a Cabinet Minister who is interested in it.

I am, &c.,
W. N. SHAW.

The Assistant Secretary,
Marine Department,
Board of Trade,
7, Whitehall Gardens, S.W.

Selection of Wireless Stations for Transmitting Weather Information to Ships at Sea.—Read—the following letter from the Board of Trade :—

M.O. 2691.

Board of Trade (Marine Department),
7, Whitehall Gardens, London, S.W.,
13th June, 1914.

SIR,

I AM directed by the Board of Trade to transmit to you the enclosed copy of the International Convention on Safety of Life at Sea and to advert to Recommendation 13 (page 63) which deals with the subject of stations for sending out weather messages to ships at sea. The Board would be obliged if you would be so good as to bring the matter before the International Meteorological Committee for its consideration and they would be glad to be informed in due course of the views of the Committee and of the action if any which it may be found possible to take to give effect to the recommendation.

I am, &c.,
W. F. MARWOOD.

The President,
The International Meteorological Committee.

A copy of the letter has been forwarded to the Secretary of the International Meteorological Committee. A preliminary step appears to be to collect information as to the names and positions of the stations which already issue meteorological information by radiotelegraphy, and this is being taken up in connexion with the preparation of a new edition of M.O. Publication 206, " Codes of Signals, &c."

Office of Works.—*Office Flag.*—Reported—that the Office of Works (M.O. 2471) proposed to include the supply of a flag for the Office mast among " recoverable " requisitions.

It was agreed to raise the question of supply on official grounds.

International Association for Seismology.—*Letter from Dr. Schuster* (Minute 449).—Read—a letter from Dr. Schuster dated 14th June stating that the Seismological Committee of the Royal Society had decided to recommend to the Treasury that Mr. G. W. Walker, and, if possible, a representative of the Meteorological Office should be nominated to represent this country at the next meeting of the Association which is to take place at St. Petersburg on 31st August, 1914. Upon inquiry it transpired that there is no special need on this occasion for a representative of the Meteorological Office to attend the meeting, and no action was taken.

469. NINTH ANNUAL REPORT (Minute 459).—A paged revise of the Report was submitted, approved, and signed on the understanding that a further revise would be circulated.

470. DAILY WEATHER SERVICE.—*Change of Units for Pressure and Rainfall in the Daily Weather Report.*—Reported—that in compliance with His Majesty's request for readings of rainfall in inches, a special form (225) had been drawn up of royal 4to. size, upon which is entered the rainfall amounts in *inches* corresponding with all the values printed in millimetres on pp. 1 and 4 of the Daily Weather Report. A single copy for the use of His Majesty is prepared daily and inserted in the copy of the Daily Weather Report transmitted to the King.

Approved.

471. OFFICE STAFF.—*Professional Assistant* (Minute 451).—Reported—that Miss Powell had requested on 4th June to be allowed to give up her duties in the Office on 30th June in order to take up work that had been offered to her in Paris, and that sanction had been given to Miss Powell's request.

Approved.

The Director was authorised to make a provisional appointment before the next meeting if he found it necessary.

472. ACCOUNTS FOR 1913–14.—**Comparison of Expenditure and Receipts (Minute 466) with the Estimates of Minute 393.**—Submitted—the following statement of expenditure and receipts for the year 1913–14, in comparison with the estimates of Minute 393.

Heads of Service.	Proposed for 1913-14.	Realised.	Difference.	
			Excess.	Defect.
	£	£	£	£
1. Director	1,000	1,000	—	—
2. Salaries : Office	9,115	9,231	116	—
3. Observatories	3,343	3,293	—	50
Expenses of Office :				
4. Rent, fuel and lighting	735	689	—	46
5. Repairs, furniture, and incidental expenses.	470	631	161	—
6. Postage	660	727	67	—
7. Telegrams	2,740	2,682	—	58
8. Travelling expenses	400	445	45	—
9. Superannuation allowances (operative) ...	1,496	1,440	—	56
10. „ fund (in addition to £209 included in operative).	541	541	—	—
11. „ fund (contingent addition)	111	—	—	111
12. Cost of Instruments	2,460	3,396	936	—
13. Expenses of M.O. Observatories	1,313	1,609	296	—
14. Grants, &c. to auxiliary observatories, anemograph stations, &c.	2,116	2,095	—	21
15. Grant for salaries &c., of Edinburgh Office	350	350	—	—
To balance in hand	—	1,155	—	—
Totals	26,850	29,284	1,621	342
Appropriations in aid :				
16. M.O. observatories : Subventions ...	1,462	2,201	739	—
17. „ Local expenses re-funded.	221	173	—	48
18. „ Office expenses re-funded.	90	108	18	—
19. Departmental expenses refunded ...	455	452	—	3
20. Incidental expenses refunded	515	678	163	—
21. Telegraphic expenses refunded	600	813	213	—
22. Inspections	160	211	51	—
23. Costs of instruments (Navy)	510	912	402	—
24. „ „ (other sources) ...	1,500	2,658	1,158	—
25. Superannuation	887	824	—	63
26. Lectures and experiments	450	254	—	196
Totals	6,850	9,284	2,744	310
Parliamentary Grant	20,000	20,000	—	—
	26,850	29,284	2,744	310

NOTES.

2. Miss Anderson, £200 (Minute 441); other variations due to changes in staff.

5. Difference in Incidental Expenses: Stationery Office is up by £31 (two years' Annual Reports paid); payment made to Hamburg for two years' synoptic charts, accounting for increase of £22; estimated amount for carriage of parcels exceeded by £28; and that for telephones and sundries by £76.

6. Cost of postage of Daily Weather Report exceeded estimate by £64, but is for the most part recoverable.

7. Only 11 months' accounts paid, making real increase of about £200; due to increase in volume of work, partly shown in repayments.

8. Increasing number of Health Resort Stations, shown in repayments.

12. Due to increase in quantity of instruments handled and shown in repayments.

13. Chiefly Eskdalemuir motor car, £110; Schulze Inductor, £60; Anemometer, £67 15*s.* 6*d.* Travelling expenses are £52 in excess owing to changes in staff and emergency arrangements. The cost of the re-equipment and refurnishing of Kew Observatory is not yet brought to account. The increase of expenditure shown in the Kew Accounts is due to the appointment of a second professional assistant not provided for in the original estimates and covered by receipt.

16. The following were not estimated :—£250 from Advisory Committee for Aeronautics; £297 from Royal Society for Seismology, and Mr. Matthew Gray's donation; £82 from Scott Fund.

20. Increase in D.W.R., £64; sale of forms and publications increasing.

21. Explained under 7.

22. Explained under 8.

23 and 24. Explained under 12: in addition a sum of over £600 was received in advance for instruments.

26. Schuster Readership: payments only made for part of the year owing to Mr. Taylor's absence on the "Scotia."

The expenditure in excess of the estimates was approved.

British Association : Meeting in Australia.—With reference to Mr. Gold's application referred to in Minute 413 it was agreed to reply that the Committee regret that they are unable to contribute a grant towards the expenses of the journey to Australia.

473. PUBLICATIONS.—**Computer's Handbook.**—Submitted—text by Mr. W. H. Dines, F.R.S., of an article setting out from the meteorological point of view the theory of errors of observation, probable errors, correlation and other allied statistical methods.

It was agreed that the article should be printed as part of the Computer's Handbook.

Geophysical Memoirs.—Submitted—diagrams and text by Mr. C. J. P. Cave relating to pilot balloon ascents carried out by him, assisted by Mr. J. S. Dines, in the Scilly Isles during November and December, 1911. The period coincided with the development of the typical winter cyclonic system with its centre in the Iceland region. It is proposed to work out the details of some of the ascents on the lines of recent papers by the Director, and to publish the results as a Geophysical Memoir.

Approved.

Publications issued.—Copies of the English edition of the *Report of the meeting of the International Meteorological Committee in Rome*, 1913, Geophysical Memoirs No. 8, *Lag in Marine Barometers on Land and Sea*, by Dr. Chree, and the *Fourth Report on Wind Structure* were laid on the table.

The Seaman's Handbook.—It was agreed that copies of the Seaman's Handbook should be bound in limp brown cloth for presentation to marine observers, and that an M.O. device from a die already prepared by Messrs. Rivière, together with the usual inscription, should be imprinted.

It was also agreed that similar bound copies of the handbook bearing the M.O. device and the name of the fishery barometer station, should be presented to the custodian of each fishing barometer around the coast, in lieu of copies of the "Fishery Barometer Manual" now nearly out of print.

474. OBSERVATORIES.—**Central Observatory for the Investigation of the Upper Air.**—Reported—that Mr. W. H. Dines had purchased a property consisting of a house, and outbuildings with five acres of level meadow land situated in the village of Benson in Oxfordshire, three miles from Wallingford which is in Berkshire on the south bank of the river Thames.

The Office property had been removed from Pyrton Hill. A portable building had been bought from Messrs. Boulton & Paul and erected as a workshop for Observatory purposes. The cost of removal and re-construction had brought the expenditure up to £9 15*s.* 3*d.* in excess of the allowance of £450 for the year. Authority for the additional expenditure is sought.

Approved.

The Director reported also that Mr. Dines had raised the question of the future provision for an Aerological Observatory, and expressed his willingness for the Office to acquire a tenure of the ground at Benson for the purpose, which would be independent of his tenure of the house.

It was agreed that a memorandum be prepared and circulated setting out the position for consideration.

Kew Observatory.—Reported—that an order had been given for the erection of an aerial at the Observatory by the Post Office, for the reception of time-signals and other wireless messages.

Also that order had been given to the Office of Works for picture rails in the Computing Room, South Hall, and East Passages to avoid the necessity for picture nails.

An estimate from Maple & Co., Ltd., for two cabinets to hold Ordnance maps and diagrams that are at present in rolls was submitted and postponed for further consideration.

Reported also—that the Director and the Superintendent proposed to give an afternoon reception at the Observatory from 4 to 6.30 p.m. on 14th July to enable visitors to view the Observatory.

Approved.

Valencia Observatory.—Reported—that the term of appointment of Mr. Cullum, superintendent, as "first-class clerk" would in the ordinary way terminate at the end of the current financial year, 31st March, 1915, in consequence of his attaining the age of 65 on 3rd February, 1915.

It was agreed that he be retired on 31st March, 1915, with the pension allowed by the regulations.

475. Director's Report and Accounts :—

International Meteorology.—The International Meteorological Committee, at their last meeting held in Rome, 1913, had recommended that the next meeting of the Conference of Directors of Meteorological Institutes and Observatories should be held in 1915; and, it being understood that Holland would be a suitable country in which to convene the gathering, it had been left to Prof. van Everdingen, Director of the Dutch Institute, to suggest a place for the meeting. He has now reported that he recommends Utrecht for the place of meeting and it is therefore proposed to hold the Conference at Utrecht in September, 1915.

Royal Society Soirées.—At the annual Soirées of the Royal Society held on 13th May and 16th June, the Office exhibited specimens of seismograms from the Galitzin recorders at Eskdale, working charts showing the material upon which forecasts and the checking of forecasts are based, a printed chart showing graphically serial monthly totals of rainfall for London for the past 100 years, and examples of mercury and aneroid barometers graduated in millibars.

Index to Minutes of the Meteorological Council.—The Director laid on the table a complete index to the Minutes of Meetings of the Meteorological Committee of the Royal Society, 1867–76, and of the Meteorological Council, 1877–1905, which had been prepared by Mr. J. S. Harding at the Director's suggestion as a memorial of the work of Sir R. Strachey.

Voluntary Assistance.—Reported—that Mr. C. N. C. Evers, of Laverstock House, Salisbury, Wilts, had offered his services as a voluntary computer by letter dated May 27th, 1914, provided the material for the computations could be forwarded to him. The offer has been accepted and Mr. Evers has already forwarded tables for the computation of the velocity of the gradient wind suitable for use with isobaric charts based on pressure values expressed in millibars, and he is now engaged upon the computation of correlation coefficients between simultaneous monthly means of pressure for Kew on the one hand and for stations in other countries on the other.

Presentation of barometer.—Reported—that the Cambridge Scientific Instrument Co. had presented to the Office the dial mercury barometer constructed by them at the Directors' suggestion (Minute 295). The instrument is very satisfactory for use, but is expensive to construct. It has been lent to Professor Duffield, on voyage to Australia to attend the meeting of the British Association, in connexion with certain gravity observations which he has in view.

Reports of Work.—0. *Library, Réseau Mondial and Technical Inquiries Section* (April).—Library :—Current work. Authors' cards prepared for 85 new volumes. 88 subject cards and 10 cross reference cards prepared. Cards for periodicals and serial publications received during the year, corrected up to 31st March, 1914. Geograpical list of Institutions supplying data (printed in Report of International Meteorological Committee at Rome, 1913), revised to 31st March, 1914. 211 books borrowed by Office staff. Book plates placed in 173 volumes. 113 volumes received from binders, examined, shelf-marked and placed on shelves. 148 volumes prepared for binding.

Number of publications received :—

(*a*) Annual	26
(*b*) Quarterly	3
(*c*) Monthly, including monthly packets of Daily Weather Reports	157
(*d*) Weekly „ weekly „ „ „ „	98
(*e*) Reports received daily	396
(*f*) Occasional publications	36
(*g*) New books and pamphlets	40
	736

Inquiries :—	Personal.	Letter.
1. Newspaper	10	1
2. Legal	3	8
3. Scientific and Commercial	25	47
4. Forecasts	—	—
5. General	5	—
	43	56

Receipts for Inquiries :—	£	s	d.
Personal	—	—	—
By letter	3	7	1
Subpœna	4	4	0
	7	11	1

Foreign and Colonial Returns :—Current work. 91 M.S. documents received and registered. Work on arrears of returns from Sierra Leone, Gibraltar, Nassau (Bahamas), Gold Coast Stations, Tulagi (British Solomon Islands), South Georgia. Preparation of Meteorological Table for South Orkneys for the Hydrographer (M.O. 1705/N.01). Part preparation of Meteorological Tables for stations in Canada for use in St. Lawrence Pilot (M.O. 1134/N.01). Sets of 100 copies of reprints from Blue Books for 1912 completed and despatched.

Réseau Mondial :—Part preparation of lustrum average forms for Gibraltar, Sierra Leone, and Tulagi.

Inquiry Assistants.—Miss Powell.—Examination of final proof of "Report of International Committee Meeting at Rome, 1913." Revising proof of Geophysical Memoirs Nos. 8 and 9. Attendance at Kew Observatory on five days at work on Library.

Miss Smith.—Preparation of information for replies to various inquiries. Translating part of Drygalski's "Greenland Expedition" and "Ice Drift in Baffin Bay" for Captain Hepworth. Checking data for South Orkneys and preparation of data from Canadian Stations for the Admiralty.

Miss Turney.—Preparation of litho-transfers for Monthly Weather Report. Roll calendar for May. Negatives and slides for Captain Hepworth. Work on various diagrams.

Absent on leave :—Mr. T. D. Bell, April 14th. Miss Powell, April 23rd–30th. Miss Smith, April 14th. Miss Buckeridge, April 14th. Mr. Braby absent on sick leave from April 8th–30th.

Mr. H. T. Smith entered the Division on April 1st and on the same date Mr. T. D. Bell took up the duties of Chief Clerk.

(May).—Library :—Current work. Authors' cards prepared for 88 new volumes and 13 cross reference cards prepared. 94 books borrowed by Office Staff. Alterations in shelf mark in Catalogue, Authors' cards and Subject cards nearly completed for all books in the lower portion of Bay II.

Number of Publications received :—797.

Inquiries :—Personal, 44 ; by Letter, 45.

Receipts for Inquiries :—£3 8*s.* 9*d.*

Mr. Brooks in attendance on May 2nd and 4th at the Admiralty Court of the High Court of Justice to give evidence in case of "Maipo" under subpœna from Messrs. Crowders, Vizard, Oldham and Co. (M.O. 1799/J.02).

Foreign and Colonial Returns :—Current work. 39 MS. documents received and registered. Work on arrears of returns from Mogador, Saffi, Ringstead Reef, Gold Coast Stations and Gibraltar. Working up arrears of returns from West African Stations in order to prepare data for Dr. Hellmann.

Réseau Mondial :—Part preparation of lustrum average forms for Gibraltar, Accra, Cape Coast Castle and Cape Spartel. Preparation commenced of monthly summaries on new forms for all stations for 1911.

Miscellaneous :—Entry on the sheets of "Who's Who" of the list of publications received in exchange from various institutions partly done. Part preparation of monthly and annual maps of sunshine, temperature and rainfall for Appendix IV. to the Weekly Weather Report. Preparation of barometer correction card for Ocean Island. Comparison of telegraphic reports of wind received from St. Helena and the curves subsequently received.

Inquiry Assistants :—Miss Powell. Preparation of humidity tables. Attendance at Kew Observatory on two days in connexion with Library.

Miss Smith.—Preparation of information for replies to various inquiries. Extracting data for stations in the Crimea for August and September for Professor H. F. Newall. Making and mounting two globes to illustrate earthquake diagrams. Extracting data for Port Darwin since 1905 for Mr. H. Arctowski.

Miss Turney.—Preparation of litho-transfers for Monthly Weather Report. Roll Calendar for June. Negatives and slides for Captain Hepworth and Mr. Gold. Work on various diagrams for Mr. Whipple and Mr. Gold. Figures for 1913 and 1914 added to London Rainfall diagram.

Publications.—Report for April and May, 1914, from Clerk of Publications :—

—	April.		May.	
	Received.	Issued.	Received.	Issued.
Daily Weather Report ...	890	854	890	876
Weekly Weather Report ...	375	343	375	344
Monthly Weather Report, &c.	600	506	600	509
Do. do. (Maps)	25	2	25	2
Daily Readings	75 (Jan.)	54 (Jan.)	75 (Feb. & Mar.)	54 (Feb.) 55 (Mar.)
Do. Title Page, 1913	—	—	75	55
Geophysical Journal, 1913 ...	150 (Mar. & Apr.)	137 (Mar. & Apr.)	—	—
Hourly Values — Meteorological, 1913 :—Kew.	300 (Feb.)	12 (Feb.)	300 (Mar. & Apr.)	12 (Mar.)
Eskdale ...	300 (Jan. & Feb.)	12 „	300 (Mar.)	12 „
Valencia ...	300 (Mar.)	12 „	300 (Apr.)	12 „
Hourly Values—Geophysical	—	—	—	—
Monthly Meteorological Charts (Atlantic).	600 monthly (to May 3).	561	600 monthly to June 3).	541
Monthly Meteorological Charts (Indian).	350 (May)	280	350 (June)	237
International Upper Air Observations, 1912.	—	—	50 (Mar. & Apr.)	31 (Mar. & Apr.)
Eighth Annual Report ...	—	—	—	3
Observer's Handbook (1913)	100	18	—	26
"Forecasting Weather" ...	13	1	—	1
Cloud Atlas	—	2	—	1
Report — Commission for Weather Telegraphy.	—	—	—	1
Report — Commission for Maritime Meteorology.	—	1	—	1
Codes of Signals, 1913 ...	—	—	—	—
Calendar, 1914	—	—	—	1
Structure of the Atmosphere.	—	—	—	—
Seaman's Handbook ...	500	35	—	12
Geophysical Memoirs, No. 1	—	1	—	4
No. 2	—	1	—	4
No. 3	—	1	—	4
No. 4	—	1	—	4
No. 5	—	2	—	3
No. 6	—	2	—	3
No. 7	—	2	—	3

Receipts from sales at M.O.—£3 7*s.* 10*d.* (April), £3 13*s.* 10*d.* (May).

New Publications.—The following publications have been received and issued : Seaman's Handbook of Meteorology, Circular 001 (A–H and J). The Rome Report, and Geophysical Memoirs 8, 9 and 10 are in the press.

M.O. Press (April).—The printing of the undermentioned publications has been as contract :—

Daily Weather Report.
Maps for the Weekly Weather Report.
„ „ Monthly Weather Report.
Monthly Meteorological Charts of the North Atlantic Ocean.
„ „ „ „ Indian Ocean.

Requisitions :—

On hand at the beginning of the month	5
Issued during month	4
	9
Discharged during month	1
Requisitions on hand at the end of the month	8

(May).—The printing of the undermentioned publications has been as contract :—

Daily Weather Report.
Maps for the Weekly Weather Report.
„ „ Monthly Weather Report.
Monthly Meteorological Charts of the North Atlantic Ocean.
„ „ „ „ Indian Ocean.

Requisitions :—

On hand at the beginning of the month	8
Issued during month	4
	12
Discharged during month	3
On hand at the end of the month	9

495 additional copies of the Daily Weather Report have been printed during the month for educational purposes.

By arrangement with the Stationery Office, the Press has undertaken the lithography required by the Board of Trade for the "Report of the voyage of the Scotia." This work has occupied most of the artist's spare time during the month.

1. *Marine Division* (April).—Logs and Registers.—Dealt with on receipt, 23 Meteorologal Logs and 1 Abbreviated Log ; also 103 North Atlantic Registers, 72 Radio-telegraphy Registers, and 11 Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic.—The Chart for May, 1914, published ; and the Chart for June, 1914, in course of preparation. Re-drawing isobars on inset chart for Absolute units of pressure. Collating and charting Monthly Salinity and Sea Surface Temperature observations in the North Atlantic in connection with investigations being carried out in conjunction with Fishery Branch of the Board of Agriculture and Fisheries.

Monthly Meteorological Charts of the Indian Ocean.—Chart for June, 1914, published ; the Chart for July, 1914, now in course of preparation.

Monthly Meteorological Charts of Davis Strait and Baffin Bay.—Preparing charts of ice distribution. Completing extraction for additional wind rose. Drawing final outline chart.

Extraction of Observations relating to China Sea.—Data extracted and tabulated from 10 logs.

Reports of Ice.—Six reports sent to "Shipping Gazette."

Corrections for Barometers obtained in connection with :—

(1) Reports by Radio-telegraphy	34
(2) North Atlantic Registers	7

Observational Duties.—Time occupied, 28 hours.

Extraction of Observations relating to selected areas for Dutch Meteorological Institute.—5th Series. Time occupied, 30 hours.

Indexing Data in Ocean Ten Degree Squares.

Obaining Information relating to Coastal Area in South Atlantic for Messrs. Goldstück, Hainze & Co., Amsterdam.—Time occupied, 3 hours.

(May).—Logs and Registers.—Dealt with on receipt, 21 Meteorological Logs ; also 121 North Atlantic Registers ; 71 Radio-telegraphy Registers, and 13 Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic.—The issue for June, 1914, published ; the issue for July, 1914, in course of preparation. Collating and charting Monthly Salinity and Sea Surface Temperature observations in the North Atlantic. Redrawing isobars on inset chart for absolute units of pressure.

Monthly Meteorological Charts of the Indian Ocean.—Issue for July, 1914, in course of publication ; issue for August, 1914, in course of preparation.

Monthly Meteorological Charts of Davis Strait and Baffin Bay.—Charting monthly results of ice to show distribution. Completing extraction of data for extended area off South-West coast of Greenland ; drawing wind-roses and finding means of Sea Temperature relating to that area.

Extraction of Observations relating to China Sea.—Date extracted and tabulated from 15 logs.

Corrections for Barometers obtained in connection with :—

(1) Reports by Radio-telegraphy	35
(2) North Atlantic Registers	2
(3) Indian Ocean Registers	2

Observational Duties.—Time occupied, 24 hours.

Extraction of Observations recorded in selected areas for the Dutch Meteorological Institute.—Sixth set. Time occupied, 120 hours.

Indexing Data in Ocean Ten Degree Squares.

2. *Forecast Division* (Central Office, April).—(1) Current Work on Daily, Weekly, and Monthly Weather Reports and on Atlantic Charts, up to date.

(2) Number of Wireless Reports received from (1) H.M. Ships, 1 ; (2) Mercantile Marine, 544 ; Wireless Reports received in time for insertion in 7 a.m. map in Daily Weather Report, 50 ; Wireless Reports received in time for insertion in 7 a.m. or 6 p.m. maps of previous day, 254.

(3) Corrections to Daily Weather Report for March issued.

(4) Wind Frequency results extracted and checked to end of December, 1913.

(5) Working Charts prepared for binding up to the end of January.

(6) Checking of 8.30 p.m. forecasts completed up to the end of December, 1913.

(7) Storm Warning checking completed :—
Anemometer Results to end of March.
English Lighthouses to end of January.
English Lightships to middle of January.
Scottish Lighthouses to end of February.
Irish Lighthouses to end of March.

(8) Inquiries :—

Prepaid Replies	18
Other Telegraphic Inquiries	3
Telephone Inquiries	7
Personal	0

(9) Serial Forecasts sent to 22 persons or authorities, including :—
(*a*) On behalf of *Admiralty* to 6 aviation stations daily.
(*b*) On behalf of *War Office* to 5 aviation stations daily for the information of the Officers of the Royal Flying Corps.

10. Admiralty Forecasts :—
(*a*) Three dockyards daily.
(*b*) H.M. Ships within range of Wireless Telegraphy (twice daily).
(*c*) Aircraft Report for transmission by Wireless Telegraphy to Aviation Stations (twice daily).
(*d*) Report for transmission by Wireless Telegraphy to Gibraltar giving Forecast of Wind in Bay of Biscay and on Iberian coast (twice daily.)

(11) Changes in Telegraphic Code.—Preparations completed for the introduction of the new telegraphic code and the adoption of the new meteorological units. New correction cards prepared and sent to all Telegraphic Reporting Stations.

(Branch Office at Farnborough, April).—The normal telegraphic observations have been continued throughout the month.

The preparation of the evening map and forecast has been continued regularly except during the Easter holidays from April 9th to 13th.

14 single theodolite pilot balloon ascents have been made, chiefly at 7 h.

A definite scheme for forecast checking at South Farnborough and Upavon has been drawn up in conjunction with Mr. Dobson of the Central Flying School.

An account of the work of the past year has been prepared for inclusion in the Annual Report, and Mr. Billett has written a brief account of the results so far obtained with the Tetranemograph for inclusion in the Report of the Advisory Committee for Aeronautics.

The setting of the sunshine recorder was readjusted at the end of the month, the original setting having proved to be not quite accurate. A special thermometer screen was also erected and the thermograph and hygrograph started to work during the month.

The Tetranemograph having proved not entirely reliable in action certain small adjustments and alterations have been made thereto by Mr. Billett with a view to obtaining more satisfactory results.

Certain information has been supplied to the R. A. F. on upper air temperatures, having reference to the calibration of aneroids for use at heights up to 20,000 feet.

In addition to assisting in much of the above work Mr. Billett has continued the preparation of an abstract of "Aeronautische Meteorologie."

The ordinary analysis work has been kept up to date.

(Falmouth Observatory, April).—Routine Work.—Monthly Return (form 355). Completed and checked for March ; April in hand.

Tabulation of :—

Barograms (form 402) } December and January rewritten on Form 430, Corrections applied, Means taken, &c. ; April in hand.
Hourly Values of Rainfall (form 410) } April in hand.
Hourly Values of Sunshine (form 403) }
Falmouth Robinson Anemograms (form 401) } Completed for March ; April in hand.
Scilly Robinson Anemograms (form 401) }
Falmouth Record of Wind Direction (form 224). Completed for March.
Scilly Record of Wind Direction (form 224). Completed for February and March.
Plymouth P. T. anemograms (form 430). April in hand.

Analysis of :—

Pendennis Pressure Tube Anemograms (form 339) } Up to date.
Scilly Pressure Tube Anemograms (form 339) }

Pilot Balloon Ascents, &c.—No balloon ascents.

Daily, Weekly, and Monthly Reports to the Press and to various authorities—County Council, &c.

Inspection of Telegraphic Reporting Station at Scilly.

Central Office (May).—(1). Current Work on Daily, Weekly, and Monthly Weather Reports and on Atlantic Charts, up to date.

(2) Number of Wireless Reports received from (1) H.M. Ships, 2 ; (2) Mercantile Marine, 519. Received in time for insertion in 7 a.m. map in Daily Weather Report, 46. Received in time for insertion in 7 a.m. or 6 p.m. map of the previous day, 261.

(3) Corrections to Daily Weather Report for April in printer's hands.

(4) Wind Frequency results extracted and checked to end of December, 1913.

(5) Working Charts prepared for binding up to 9th February.

(6) Checking of 8.30 p.m. forecasts completed up to end of December, 1913.

(7) Storm Warning checking completed :—

Anemometer Results to end of March.
English Lighthouses to end of April.
English Lightships to middle of May.
Scottish Lighthouses to end of March.
Irish Lighthouses to end of April.

(8) Inquiries :—

Prepaid Replies	11
Other Telegraphic Inquiries	14
Telephone Inquiries	13
Personal	1

(9) Serial Forecasts.—Sent to 20 persons or authorities including—

(*a*) On behalf of the *Admiralty* to 6 Aviation Stations daily.
(*b*) On behalf of the *War Office* to 5 Aviation Stations daily for the information of the Officers of the Royal Flying Corps.
(*c*) On behalf of the *Board of Agriculture* to Agricultural Shows in various parts of the country.

(10) Admiralty Forecasts :—

(*a*) Three dockyards daily.
(*b*) H.M. Ships within range of Wireless Telegraphy (twice daily).
(*c*) Aircraft Report for transmission by Wireless Telegraphy to Aviation Stations (twice daily).
(*d*) Report for transmission by Wireless Telegraphy to Gibraltar giving forecast of wind in Bay of Biscay and on Iberian coast (twice daily).

(11) Harvest Forecasts.—Preparation made for the commencement of this Service. Copy of Circular 052 sent to over 1,000 persons or authorities.

(12) Adoption of New Units and Changes in Telegraphic Code.—The new arrangements commenced on May 1st, and worked upon the whole quite satisfactorily.

(Branch Office at Farnborough, May).—The normal telegraphic observations have been continued throughout the month.

The preparation of the evening map and forecast has been continued regularly.

By special request the evening forecast was transmitted daily by telephone to the Royal Pavilion during the stay of His Majesty at Aldershot.

During the month a new self-recording raingauge has been put into working order and set up in the thermometer enclosure. The record commenced on the 20th.

18 single theodolite pilot balloon ascents have been made.

Some preliminary experiments have been made on the errors in the records obtained from a Campbell-Stokes sunshine recorder.

The setting of the sunshine recorder has been very carefully checked and the base cemented in position.

I have checked Mr. Dobson's forecasts at the Central Flying School, Upavon, for the past term.

The ordinary analysis work has been kept up to date.

The station was inspected by Mr. Gold on the 26th of the month.

Mr. Billett has made certain alterations to one self-recording theodolite and to the tetranemograph. The latter failed during some high winds at the beginning of the month. Since it was overhauled the wind has been too light for useful experiments.

Mr. Billett has also improved the working of the Yawmeter (an instrument lent to the Meteorological Office by the Royal Aircraft Factory) and has assisted in the pilot balloon and other work of the Office. He has continued his abstracting work of "Aeronautische Meteorologie."

(Falmouth Observatory, May).—Routine Work.—Monthly Return (form 355). Completed and checked for April (two copies) ; May in hand.

Tabulation of :—

Barograms (form 402). November rewritten on form 430, Corrections applied, Means taken, &c., and checked.

Hourly Values of Rainfall (Form 410)
Hourly Values of Sunshine (Form 403)
Falmouth Robinson Anemograms (Form 401)
Scilly Robinson Anemograms (Form 401)
} Completed and checked for April ; May in hand.

Falmouth Record of Wind Direction (Form 224)
Scilly Record of Wind Direction (Form 224)
} Completed and checked for April.

Plymouth P.T. Anemograms (Form 430). Completed and checked for April ; May in hand.

Analysis of :—

Pendennis Pressure Tube Anemograms (Form 339)
Scilly Pressure Tube Anemograms (Form 339)
Plymouth „ „
} Up to date.

Pilot Balloon Ascents, &c.—One pilot balloon ascent—May 27th ; height, 1·7 km.

Inspection of 10 Meteorological Stations, May 11th to May 21st.

Daily, Weekly, and Monthly reports to Press and various authorities—County Councils, &c.

Arrangements have also been completed for the exhibition of information at the Custom House.

3. *Statistical Division* (April).—British Meteorological and Magnetic Year Book.—1. Weekly Weather Report :—Current Issues (Nos. 12, 13, 14, 15, 16). Quarterly Summary, January–March. Appendix II., 1913, issued. Appendix IV. Monthly Averages for the periods of 35 and 40 years ending with 1910, sent to the printer.

2. Monthly Weather Report.—March issued 27th April.

3. (i) Daily Readings.—January, 1914, issued. February, passed for press.

(ii) Geophysical Journal.—March and April, 1913, issued. Registrar's-General (England and Ireland) Reports and Tables for first Quarter prepared.

4. (i) Hourly Readings :—

Valencia.—March, 1913, issued ; April and May, copy sent to printer ; June, copy in hand.

Kew.—March, 1913, signed for press ; April, copy sent to printer ; May in hand.

Eskdalemuir.—March, 1913, ready for press (awaiting reply to inquiry relating to height of raingauge) ; April, ready for printer ; May, in hand.

Aberdeen, Falmouth } Hourly means for January, 1913, worked.

(ii) Hourly Values, 1912, Geophysical.—Pages 57–83 with the Introduction (completion of volume) ready for press.

Anemograms.—Pressure-tube anemograms from 13 stations analysed, and from 4 stations tabulated, up to 25th April. In addition to these 5 stations are summarised by Mr. Dines, 3 stations are summarised at Falmouth, and the Eskdalemuir records are summarised and tabulated at the Observatory.

Robinson cup anemograms from 5 stations tabulated up to 27th April. Besides these 2 stations are tabulated at Falmouth.

Sunshine Cards.—The cards from 75 stations were examined. A selection of 5 cards from each station has been remeasured, and returned with a comparison of the Meteorological Office and the observer's estimate of duration.

Cards from 123 stations filed in the Office.

Aneroidograms.—Form 531 from 30 stations filed up to date ; Form 533 from 15 stations filed up to date.

Thermograms.—Form 542 from 1 station, Form 547 and 548 from 6 stations, and Form 549 from 1 station, filed up to date.

Miscellaneous.—Rain curves and Hyetograms from 7 stations ; Microbarograms from 2 stations ; Radiograms from 1 station ; and Hygrograms from 3 stations ; filed up to date.

Rainfall returns from 87 stations entered on Form 372.

Hourly Tabulations of Wind Velocity were made from the Roche's Point anemograms for 50 days in 1911, 1912, and 1913, and sent to Mr. Price, the Cork Harbour Engineer. Copy of Aberdeen wind tabulations for 1st—9th December, 1912, and number of gusts of Storm Force during the same period, sent to Messrs. Adam, Thomson and Ross. Notes prepared for Inspectors for 42 stations.

(May).—British Meteorological and Magnetic Year Book.—1. Weekly Weather Report :—Current Issues (Nos. 17, 18, 19, 20) Wind Summary for Appendix III. sent to printer. Sea Temperatures for do. prepared.

2. Monthly Weather Report :—April issued.

3. (i) Daily Readings :—Title page, map and Introduction 1913, and March, 1914, issued.
(ii) Geophysical Journal :—None issued. [May, 1913, extra large number.]

4. (i) Hourly Readings :—

Valencia :—April, 1913, issued ; May, copy with printer ; June, copy in hand.
Kew :—April, 1913, issued ; May, copy sent to printer ; June, copy in hand.
Eskdalemuir :—March, 1913, issued ; copy for April and May sent to printer.
Aberdeen :—Hourly Means for February, 1913, in hand.

(ii) Hourly Values Geophysical, 1912 :—Completed volume in the press.

Anemograms.—Pressure tube anemograms from 13 stations analysed, and from 4 stations tabulated, up to 23rd May. In addition to these 5 stations are summarised by Mr. Dines, 3 stations are summarised at Falmouth, and the Eskdalemuir records are summarised and tabulated at the Observatory. Robinson cup anemograms from 5 stations tabulated up to 25th May. Besides these the records from 2 stations are tabulated at Falmouth.

Sunshine Cards.—The cards from 76 stations were examined. A selection of 5 cards from each station has been re-measured, and returned with a comparison of the Meteorological Office and the observer's estimate of duration. Cards for Balruddery and Bath measured for use in Monthly Weather Report. Cards from 123 stations filed in the Office.

Aneroidograms.—Form 531 from 30 stations, and Form 533 from 15 stations, filed up to date.

Thermograms.—Form 542 from 1 station, Form 547 and 548 from 6 stations, and Form 549 from 1 station, filed up to date.

Miscellaneous.—Rain curves and Hyetograms from 7 stations ; Microbarograms from 2 stations ; Radiograms from 1 station, and Hygrograms from 3 stations ; filed up to date.

Rainfall returns from 80 stations entered on Form 372.

Notes prepared for Inspectors for 28 stations.

4. *Instruments Division.*—(April and May).—Supplies to complete establishments have been sent to the following Dockyards :—Sheerness, Devonport, Chatham, Portsmouth, Pembroke, Haulbowline, Hong-Kong, Bermuda, Cape of Good Hope, Malta and Gibraltar.

For the Marine Division instruments have been sent to the agents at Cardiff, Southampton, Liverpool and Shields, as well as to eight ships and four sea-temperature stations.

Three new Storm warning Cones have been issued. Six regraduated barometers and six millimetre raingauge glasses have been sent to telegraphic stations. The new telegraphic station at Tynemouth was provided with a complete set of instruments. A Fortin barometer, with millibar graduation, has been sent to Falmouth. A microbarograph, specially fitted with a non-magnetic case, was made for Kew Observatory as well as a "nilometer" for following the variation of the depth of water in the well. The latter instrument has a hollow copper sphere loaded with lead as float, it is suspended by a graduated German silver tape which is connected with a counterpoise by a pair of strings passing over a pulley. Thirty requisitions from private observers have been completed. These include a complete outfit (for Banff) and six barometers with the new graduation. Five small colonial orders have been carried out. A large Robinson anemometer has been sent out for the Russian Meteorological Service.

Exhibits have been sent to the Royal Society and the Royal Institution and also to Major Baden-Powell (for the Anglo-American Exhibition).

Specifications have been prepared for a new type of station barometer, graduated in millibars, so as to be correct at 285° A. In accordance with a suggestion of Mr. Gold the attached thermometers are to be provided with sliding scales on which the corrections to the barometer-reading for latitude, temperature and height above sea level are combined.

The Committee appointed to consider the constants of Pressure Tube Anemometers has presented an interim report and made the following recommendations :—

1. A suction head should be made to Dr. Stanton's design and tested in the wind channel.
2. That experiments leading up to the design of a neutral head should be undertaken.
3. That no modification in the design or use of pressure-tube anemometers should be made until the conclusion of these experiments.

Observatories.—Kew (April).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	5	
	Inclination	4	
	Horizontal Force	4	
Potential Gradient on		16	days
Wilson Apparatus on		9	„
Ebert Apparatus on		6	„
Pyrheliometer on		12	„

International cloud observations were made on 3 days.

The vertical force magnet, constructed by Adie for Toronto, was run for some time in the place of the Kew magnet, and the curves obtained were satisfactory. The instrument has been returned to the maker to have the temperature compensation improved. The Kew vertical force magnet was replaced and a scale value determination made. Several comparisons have been made of the working standard Newman barometer with the absolute standards, and a number of readings have been taken of a barometer sent over by the National Physical Laboratory with a view to inter-comparing their standard barometers with those at Kew.

Three dip circles, each with 4 needles, and tripod stands have been ordered from Mr. Dover at the request of General Rykatcheff for the Russian Government; these are to be tested at Kew before delivery.

Some special atmospheric electricity observations at sunset have been made by Mr. Nichols.

Mr. Stewart returned from Eskdalemuir at the end of the month.

The new fence has been concluded, the new shrubs have been planted, and the new paths are under construction.

Miss Powell and Miss Corrin have made considerable progress with the books.

The new pressure tube anemometer has been erected by Munro.

(May).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	4	
	Inclination	4	
	Horizontal Force	4	
Potential Gradient on		9	days
Wilson Apparatus on		19	„
Ebert Apparatus on		19	„
Pyrheliometer on		8	„

International cloud observations were made on 3 days.

A scale value determination was made of the electograph, and the scales of the two pressure tube anemometers were compared with the water gauge.

Lieut. Dauglish, H.I.M.S., commenced a course of instruction in the use of magnetic instruments.

The vertical force magnet, made by Adie for Toronto, was received back from the maker who had fitted it with a new temperature compensation bar. Experiments are being prosecuted as to the efficiency of this bar.

One solar maximum thermometer was compared with the standard on behalf of the National Physical Laboratory.

Some additional observations have been made with the Wilson and the Ebert apparatus near sunset, and also at various hours other than 3 p.m. or sunset on 4 days.

The Gassiot Committee met at the observatory on the 27th.

Some magnetic observations were made on the same day by Mr. G. W. Walker.

The alterations to the grounds and paths by Mr. Hannell have been completed.

Eskdale (April).—Staff.—Mr. Stewart returned to Kew on 22nd. The Superintendent was away from the 7th to 21st during which time he visited the M.O., and Kew and Shide Observatories. The division of duties remains substantially the same as in my statement for March.

Grounds and Buildings.—Additional drains have been cut in boggy places. The underground continues in a tolerably dry condition. The water removed from the trench during this year only amounts to only 600 cc. The wood beam in the roof, which was suspected of bending, appears if anything to be straightening itself. The measurement given in the September and November reports is now 191·0 centimetres. Mould still tends to spring up and the atmosphere is not conducive to thinking.

Magnetics.—Absolute observations have been made weekly as usual and the magnetographs appear to be in good order. A report on their azimuths will be forwarded shortly. Mr. Stewart made considerable progress with P, Q, base values and other magnetic reductions. The state of the tabulation is the following :—

——	N.	W.	V. August 1st to
Curves read once	To date ...	To date ...	February 9th
„ „ twice	„ ...	„ ...	„
Converted to γ	December 31st	December 31st	Not yet.
„ P and Q		End of December.	
Individual base values	August 31st ...	August 31st ...	Not yet.
Smoothed base values	June 30th ...	June 30th ...	„
Monthly sheets begun...	June	May	„
„ „ finished	May	Not yet ...	„

Meteorology.—The usual work has been continued and the tabulations are up to date. Some heliometer observations were made and the instrument and galvanometer were taken to Kew by Mr. Stewart for verification.

The camera for cloud photography has been mounted on the top of the Bosch theodolite so that its orientation can be adjusted and read.

Atmospheric Electricity.—The electrograph is running. Absolute observations of potential gradient have been made and it is intended to repeat them at intervals of about a fortnight.

Seismology.—The Galitzin and Omori instruments are running, the Milne has been discontinued. The tabulations are finished up to the end of February with the exception of the microseisms for August to December, 1913.

Car.—New piston rings have been made and fitted.

Wireless.—The strength of the signal is being estimated for the B.A. Committee by Mr. Skelton.

The inventory is being completed and the apparatus sorted.

(May).—Staff.—The Superintendent was in London for the Gassiot Committee, May 26th to 29th. Mr. Dines has this morning (June 1st) set off on inspection duty.

Grounds and Buildings.—Moisture has begun to condense in the underground and white mould is growing again even on wood treated with $HgCl_2$ and creosote.

Several visitors from H.M. Office of Works are expected on June 5th.

Magnetics.—The usual observations have been made. Until recently the inductor has stood on pillar 3 (West hut) and the dip circle on pillar 6 (East hut). On May 12th their positions were interchanged. Immediately before and after the change a number of observations were made with the inductor by Mr. Dines and Mr. Harris. These, in conjunction with the magnetograms, should give a measure of the difference between the dip on pillars 3 and 6. Observations with the dip circle are being made occasionally for the present but it is proposed to discontinue them when the comparison with the inductor has been worked out.

The tabulations are in the following state :—

——	N.	W.	V. 1913, August 1st to
Read once	To date ...	To date ...	May 16th.
„ twice	„ ...	„ ...	May 11th.
Converted to γ	December 31st	December 31st	December 31st (unchecked).
P and Q		January 31st.	
Individual base values	January 31st ...	January 31st ...	January 31st.
Monthly sheets begun...	June, 1913 ...	May, 1913 ...	Not yet.
„ „ finished	May, 1913 ...	Not yet ...	„

Meteorology.—The usual work has been continued and the tabulations are up to date.

Photographic studies of clouds has been made on two occasions.

The month has been cloudy and only seven pilot balloon ascents have been made.

The scale value of the dry bulb thermograph is under investigation.

Atmospheric Electricity.—A number of observations have been made in the pit by Mr. Dines to determine the electrograph factor. The results vary between 4·7 on a calm night and 5·6 on a windy day. The factor was deduced from measurements made last summer and in view of the uncertainty it has been thought best to use it for the months of 1913 which are yet to be computed, although the digits in the decimal places must be regarded as a convention rather than a physical fact.

The curves have been read up to date.

An observation has been made with the Ebert apparatus.

Seismology.—The Galitzin and Omori instruments are running. The earthquakes are tabulated up to the end of March. The microseisms for January, February, and March are done but require checking and those for September to December of last year are left to be done as required.

Schuster Reader's Report for 1913–14.—In the Lent Term I gave a course of eight lectures on "Meteorology" treated from a dynamical point of view, in pursuance of the following announcement in the *Cambridge University Reporter*.

"Mr. G. I. Taylor will deliver a course of lectures on "Meteorology" on Thursdays during the Lent Term at 5 p.m. in the Cavendish Laboratory. Special attention will be paid to Weather Forecasting and to recent researches in the Upper Atmosphere. First Lecture, January 22nd. No fee."

In Lecture 1 I gave an account of the kind of phenomena observed by meteorologists and a description of the instruments used by them. In Lectures 2 and 3 I discussed the causes of the motion of the atmosphere, the meaning of "gradient" wind, and the theories of the general circulation of the atmosphere.

Lectures 4 and 5 were devoted to the thermodynamics of the atmosphere, the formation of clouds and the effects of the sea and of the land on the air blowing over it. In Lectures 6 and 7 I described some of the apparatus used in the investigation of the upper air, and gave an account of some of the results obtained. Most of Lecture 7 was devoted to a discussion of Mr. Dines' conception of the circulation in a cyclone.

In Lecture 8 I touched on weather forecasting, but I had not time to do justice to the subject.

During the Michaelmas and Lent Terms I worked up the results of the Scotia Expedition and wrote a report on the subject.

The phenomena observed on that expedition were mostly near the surface, where conditions are governed largely by wind eddies. It became necessary to devise a method of treating disturbed motion so that average effects could be discussed without a knowledge of the actual form of the disturbance. A good deal of time was spent in doing this.

The method was applied to a discussion of the temperature and the wind velocity at different heights above the sea. The results obtained, together with some smoke photographs taken from the "Scotia," seemed to indicate that eddies in the atmosphere are not due so much to the action of the rough surface of the ground as to the dynamical instability of layers of air moving relatively to one another. I have therefore spent the May Term in discussing the stability of air in laminar motion.

The chief result is the finding of a "criterion" similar to that of Osborne Reynolds for disturbed motion in a viscous fluid. In Reynolds' case viscosity is the stabilising influence, while in the case of the atmosphere the criterion is governed by the decrease in density with height.

Other results concern the form instability is likely to take.

In the course of the investigation it became necessary to calculate the motion of a cylinder in a fluid in rotational motion. This proved unexpectedly difficult, but the problem was solved for the cases of uniform shearing and uniform rotation. These are apparently the only cases in which the motion of a solid in a rotationally moving fluid has been determined.

Accounts.—*Superannuation Annuities.*—Reported—that in accordance with the resolution of the Committee (Minute 443) on May 8th the sum of £541 was invested in £753 17*s.* 5*d.* 2½ per cent. Annuities (Payment Voucher 147) which, added to £1,380 5*s.* 11*d.* already held, made £2,134 3*s.* 4*d.* available for the purchase of annuities.

Reported further—that on 29th May the sum of £2,052 5*s.* 2½ per cent. Annuities was transferred to the Commissioners for the Reduction of the National Debt for the purchase of an Immediate Annuity of £150 on the life of Mr. J. A. Curtis. The annuity is held jointly in the names of the Permanent Secretary of H.M. Treasury and the Director of the Meteorological Office, and the first dividend is due on the 5th July. Bankers' and Brokers' charges amounted to 11*s.* 6*d.*

The amount of 2½ per cent. Annuities now held is £81 18*s.* 4*d.*

Submitted—The following statement of the Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on 28th April, 1914	6,345	4	7
Receipts from 29th April to 23rd June	1,473	11	2
	7,818	15	9
Cheques drawn from 29th April to 23rd June	5,210	15	3
Balance on 23rd June, 1914	£2,608	0	6

FIFTY-SEVENTH MEETING.

South Kensington, S.W., 28th October, 1914.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	CAPTAIN LYONS.
THE HYDROGRAPHER.	DR. SCHUSTER.

476. The Minutes (467–475) of the last Meeting (24th June, 1914), previously circulated, were taken as read, and confirmed.

477. CORRESPONDENCE.—**Treasury.**—Read—Treasury letter 14364/14 of 21st July 1914, transmitting the following Treasury Minute, dated 17th July, appointing Captain J. F. Parry, R.N. to be a member of the Meteorological Committee in succession to Rear Admiral Purey Cust :—

14364/14.

TREASURY MINUTE DATED 17TH JULY, 1914.

My Lords read again Treasury Minute dated the 20th May 1905, respecting the constitution of the Meteorological Committee, and the 3rd September 1909, appointing Captain H. E. Purey Cust, R.N. (now Rear Admiral Purey Cust, C.B.), Hydrographer of the Navy, to be a member of the Meteorological Committee for a period not exceeding five years.

They have before Them a letter from the Admiralty to the Meteorological Office relative to the appointment of Captain John F. Parry, R.N., to be Hydrographer of the Navy as from the 16th August 1914, in succession to Admiral Purey Cust.

My Lords are accordingly pleased to appoint Captain Parry to succeed Admiral Purey Cust as a member of the Meteorological Committee for a period not exceeding five years from the 16th proximo.

Captain Parry, who had taken up the Office of Hydrographer on September 1st, 1914, attended, and took his seat as a member of the Committee.

Public Record Office.—Reported the receipt from the Public Record Office of a "Reprint of Statutes, Rules and Schedules governing the disposal of Public Records by destruction or otherwise, 1877–1913," showing what the procedure is when it is desired to provide for the destruction of public documents not worthy of permanent preservation, and what has been done in this regard to the end of the year 1913.

The only reference to the Meteorological Office occurs in a Schedule under the heading "Treasury" in which M.O. vouchers dated 1867–1871 are included among papers which will be destroyed in due course ; a statement is made in parentheses that more recent vouchers are forwarded to the Comptroller and Auditor General, in whose department they come under the operation of a schedule laid before Parliament in 1884.

Royal Society.—"*K.O.*" *Monogram.*—Reported—the receipt of the following letter from the Royal Society (2863/D. 13).

The Royal Society,
Burlington House, London, W.,
24th June, 1914.

DEAR SIR,

WHEN arrangements were made for the transference from Kew to Teddington of the test work carried out at Kew by the Executive Committee of the National Physical Laboratory, it was agreed that the Committee of the Laboratory, acting for the Royal Society, should retain the sole right to the use of the K.O. mark on instruments which pass the tests of the Committee.

The mark is registered by the Royal Society as a Trade Mark, and in connection with this registration the Board of Trade have asked for a formal statement to show that the right to use the mark is retained by the Royal Society and has not been made over by them to the Meteorological Office.

The papers dealing with the arrangement between the Society and the Meteorological Office as to Kew Observatory do not refer to the matter, and we should be glad therefore to receive from you, for transmission to the Board of Trade, a letter which will make the position clear.

Yours faithfully,
ARTHUR SCHUSTER,
Secretary, R.S.

The Director,
The Meteorological Office.

A draft reply was prepared, circulated to the Meteorological Committee for approval, and despatched on 23rd July. On the 29th July the following letter was received from the National Physical Laboratory (3389/D. 13.).

The National Physical Laboratory,
Teddington, Middlesex,
28th July, 1914.

DEAR SHAW,

I HAVE just seen a letter to the Royal Society as to the use of the K.O. mark. I am afraid the earlier letter did not make the matter clear. The K.O. mark has been registered as belonging to the Laboratory for some five or six years, but the registration only included scientific instruments. Someone has ruled that Clinical Thermometers are not "Scientific Instruments" but "Medical Appliances" and the registration papers have to be amended accordingly.

The Board of Trade ask for "a formal statement of the consent of the Meteorological Office to the continued use by the Royal Society of the K.O. mark."

Can you write something, either to me or to the Royal Society, which will meet this requirement putting it quite briefly; the matter is urgent as we are stopped in prohibiting the use of the mark in Argentina by the technical question raised by the Board and clinical thermometers marked in Germany with the K.O. mark are being sold freely in South America.

Yours very truly,
R. T. GLAZEBROOK.

Dr. W. N. Shaw, F.R.S.,
Director, Meteorological Office,
South Kensington, S.W.

The following reply was returned on 31st July:—

SIR,

31st July, 1914.

WITH reference to your letter of July 28th, I beg leave to say that the Meteorological Office raises no objection to the continued use, by the Royal Society, of the K.O. mark for registration as a Trade Mark on behalf of the National Physical Laboratory, or the extension of the registration to include "Medical Appliances" as well as "Scientific Instruments."

I am, &c.,
W. N. SHAW.

The Director,
The National Physical Laboratory,
Teddington, Middlesex.

Post Office.—*Supply of Forecasts, &c., by Telephone.*—Reported—the following correspondence with the Post Office (*See* Minute 460):—

SIR,

2nd July, 1914.

THE Meteorological Committee has for some time had before it the desirability of arranging for the distribution of weather forecasts by telephone. Such a service would probably prove popular if well organised. No public funds are available to defray the cost of the service which must be made self-supporting. We have already a restricted arrangement under which forecasts are communicated by telephone to persons who have a deposit here. This system is capable of some extension but the use of the telephone will not become general so long as the Office number is kept out of the telephone directory and difficulties arising from the collection of the prescribed fees have hitherto prevented the publication of the number.

It will be within your recollection that arrangements were made many years ago for forecasts to be supplied by reply-paid telegrams on which the fees are collected on behalf of this Office by your department (Post Office Guide, Meteorological Telegrams).

From inquiries made recently I have gathered that the scheme outlined in the last paragraph of the enclosed draft circular might prove practicable. The procedure would be as follows:—

A subscriber to the London Telephone System having no deposit account at this Office desiring to obtain current weather information by telephone, would ring up this Office, whereupon he would be asked to give his name and telephone number and to state the nature of the information required. Having obtained this information, the clerk in charge of the telephone at this Office would ring off. After an interval of a few minutes he would call the number given to him, and, after ascertaining that the forecast was expected, state that the fee of given amount would be booked against the subscriber's account with the Post Office, and communicate the information.

A statement would be supplied from this Office to the Controller of the London Telephone Service giving the particulars of such fees. Such a statement could be rendered daily, weekly, or monthly as might be found convenient.

I shall be obliged if you will bring this matter to the notice of the Postmaster General with a view to its favourable consideration.

I am, &c.,
W. N. SHAW.

The Secretary,
General Post Office, E.C.

METEOROLOGICAL OFFICE (5820/5821 WESTERN).

Supply of Weather Information by Telephone.

Arrangements have been made for the supply of weather information by telephone in response to inquiries received by telephone to persons who have a deposit upon which the Meteorological Office can draw to cover the charges set out below.

The information supplied may consist of (1) the latest reports of the state of the weather at any British or foreign station from which telegraphic reports are received; or (2) Weather forecasts based on these observations.

A forecast is a statement of the weather to be expected during the period to which the forecast refers, arranged, generally speaking, as follows :—Direction and force of the wind, state of the sky as regards cloud, prospect of rain, snow, or thunder, temperature, and, in the case of the sea districts, sea disturbance. For example, the forecast for a land district referring to the twenty-four hours from the following noon or midnight, according to the time of issue, may read : "Light south-easterly to easterly winds ; fine at first, cloudy later, with local thunder showers. Becoming cooler." The forecast for a sea district may read : "Strong southerly and south-westerly winds, with squally, showery weather and a rough sea."

Forecasts are issued at 10 a.m., 1.30 p.m., and 7.30 p.m. They refer to the twenty-four hours beginning with the noon or midnight next following their issue and this period can only be extended when the meteorological conditions are sufficiently definite. On such occasions a "further outlook" extending the period covered to two or more days is added. The information for the region of the British Isles is generally sufficiently complete by 8.15 a.m. to justify the preparation of a forecast of the probable wind and sea disturbance likely to be experienced during the day. Forecasts for the English and Irish Channels based on the morning observations can be supplied at that hour.

For the purpose of forecasts the region of the British Isles is divided into land districts and sea districts as indicated on the accompanying map.

The authorised scale of charges is as follows :—

3*d.* each for a forecast for a single district and the "further outlook" if any, or for a report from a single station.
6*d.* for reports from two stations or separate forecasts for two districts.
1*s.* for the set of forecasts and general inference and "further outlook."
2*s.* for a special report.

By special arrangement with H. M. Postmaster General subscribers to the London Telephone System can have the charges booked against their telephone deposit with the Postmaster General. A subscriber desiring to avail himself of this arrangement should ring up the Meteorological Office, give his name and telephone number, specify the information desired and ring off. The Meteorological Office will then call subscriber's number and communicate the information after a brief interval.

138480.

General Post Office, London,
4th September, 1914.

SIR,

With reference to your letter No. T. 01/2844 of the 2nd of July on the subject of a proposed scheme for the distribution of weather forecasts by telephone to subscribers in the London Telephone Area, I am directed by the Postmaster General to say that similar proposals were considered in 1910, and to enclose a copy of the letter of the 9th of November, 1910, from this Office explaining the difficulties in the way of carrying out any such arrangement.

Renewed consideration has now been given to the matter but in view of the objections which were previously pointed out and are still entertained on the grounds of accounting work involved and the need for observance of special instructions in the various telephone Exchanges, the Postmaster General regrets that he cannot see his way to assist in a scheme of the kind suggested.

I am, &c.,
L. T. HORNE.

The Director,
Meteorological Office.

[The enclosure is not reproduced here. It was referred to in Minute 277 of 7 December, 1910.]

Board of Trade.—*Apparatus from the "Scotia."*—Reported—that the Board of Trade intimated on 11th September, 1914, that certain apparatus from the "Scotia," viz. :—4 hand winders, 1 aluminium pulley, and 1 wood pulley, which had been obtained for use in connection with meteorological observations by means of kites during the cruise, was not required by the Board, and might be used or disposed of by the Meteorological Office.

The apparatus has been accepted (3946/124).

478. EMERGENCY ACTION DURING THE WAR.—Submitted—the following report by the Director :—

1. *Wireless Receiver.*—The apparatus for receiving wireless messages was dismantled by the Post Office on 3rd August.

2. *Instruments.*—On the same day a demand was received by telegram to make up the establishment of meteorological instruments at Devonport. The supply was despatched, and the establishments at all the dockyards and at the office have been made up.

Loss of Instruments.—The S.S. "Nicoya" is held up in Hamburg ; the S.S. "Ningpo" is held up at Tsingtau ; the S.S. "Kaipara" was sunk by an enemy cruiser ("Emden") ; the S.S. "Oceanic" was wrecked on the north coast of Scotland ; the "Manchester Commerce" was sunk by a mine.

The steamers "Gryfevale" and "Kabinga" were captured by the "Kaiser Wilhelm der Grosse," but were sent to a British port with crews of other captured steamers, which were sunk.

All of the above carried the M.O. instrumental outfit.

Mr. Gold on his return from Australia reports that a theodolite lent to him for observations of pilot balloons on the S.S. "Euripides" was left by him with the chief officer of that vessel, to be brought back to England on the return voyage, and that the "Euripides" had been taken over by the Admiralty as a transport.

3. *Daily Weather Service.*—In view of the importance of detailed information as to fog, &c. it has been arranged to add Falmouth, Deerness, and Markree Castle to the list of reporting stations. Blacksod Point has dropped out.

4. *Meteorological Reports by telegraph from abroad.*—At the commencement of the censorship of telegrams the address "Weather London" was not allowed, and telegrams were also refused on

account of the code. The reports from foreign countries were gradually cut off, and for some days practically no foreign reports were received. The Azores and Madeira commenced to send reports 'en clair,' and subsequently "Weather London" was included amongst official addresses. Since that time the reports have come in from all countries except Germany, Belgium, and Iceland. The Iceland messages can only be received if the Telegraph Company, which is Danish, is allowed to distribute them to all subscribing countries. A telegraphic report has come in from Reykjavik, but so far it has not been fully understood. Reports from the Atlantic by wireless have practically ceased.

5. *Reports to Foreign Countries.*—No meteorological reports are being sent to foreign countries. Representations asking for restitution of the service have been received from Sweden, Denmark, and Holland, and a request to institute a new direct service has been received from Russia. Reports were sent to France 'en clair' from 14th August to 20th October, and to Brussels from 14th August to the occupation of that city, and to Antwerp from 7th September till 11th October. The reports to France were discontinued because they were made public in the Paris Bulletin. It was also believed that they were included in the Eiffel Tower message, but no precise information is obtainable.

6. *The Daily Weather Report.*—The Report was issued as usual, with such modifications as seemed desirable, until 15th October, when the following circular was issued to subscribers as the result of an interview on 1st October with the Secretary of the Admiralty.

METEOROLOGICAL OFFICE.

Daily Weather Report.

Government has requested, as a temporary measure, that certain restrictions may be placed upon the supply of information from the Meteorological Office, and the Meteorological Committee have accordingly decided to discontinue for the time being the daily issue of the lithographed copies of the Daily Weather Report.

Subscribers' files will be completed by the subsequent issue of copies unless the subscribers intimate their preference for carrying over their subscription till the ordinary daily issue is resumed. In the meantime copies of the forms 202 and 216, of which a specimen is enclosed, will be sent by the customary post if desired.

In other respects the supply of information will be limited to the issue of official forecasts and weather information to the morning and evening papers.

W. N. SHAW,
Director.

15th October, 1914.

In reply, 94 regular recipients have asked for Forms 202, 216 to be supplied; 55 subscribers, including most of the educational establishments to which the report is sent, have asked for their subscriptions to be carried over; 18 recipients have asked to have their files completed in due course, but do not desire to receive Forms 202, 216, while the remainder, about 400 have not replied to the circular, and, in accordance with the terms of the circular, their files will be completed in due course

The issues to the Press have been confined to forecasts (without explicit reference to pressure or wind) and particulars of temperature, rainfall, and sunshine in London and at the health resorts.

The Report is still lithographed as usual, but sent only to certain official addresses. Instructions are awaited for making up sets to Greenwich and other observatories, and to subscribers. It is proposed to issue them not less than one week after date.

Instructions are required as to inquiries for forecasts or other information addressed personally or otherwise to the office.

6A. *Reports to Admiralty Departments.*—Requests have been received from the Admiralty to supply:—

1. Advance copies of the Daily Weather Report to the War Room, Admiralty.
2. Special telegraphic reports and advance copy of the Daily Weather Report to the Commodore in Charge of Submarines, Harwich.
3. Telegraphic reports to 19 specified addresses similar in form to the message circulated in peace time by wireless to H.M. Ships in home waters in place of those reports and the usual forecasts to the Dockyards.
4. Telegraphic reports twice a day addressed to the First Lord of the Admiralty.

These are in addition to the following services which had been previously in operation and have been continued:—

5. Special telegrams morning and evening to Naval Air Stations, Eastchurch, Grain, Warsash, Felixstowe, Great Yarmouth, Farnborough, Kingsnorth, Fort George.
6. Cypher of map and forecasts, morning and evening, for the Naval Air Service prepared for transmission by wireless.
7. Advanced copy of the morning map sent to Eastchurch.
8. Advance copies of all daily reports prepared in the office sent to Kingsnorth.

The wireless report prepared for transmission to Gibraltar has been discontinued.

Telegrams similar to those enumerated in 5 have been sent to the various stations of the Military Wing of the Royal Flying Corps.

7. *Special 3 a.m. Service of Reports and Forecasts.*—Arising out of an application to the Borough Surveyor of Dover on behalf of a Naval air-crew for observations of wind and forecasts of weather at daybreak, a service of reports from stations at 3 a.m. and forecasts based upon them, is now in operation. The stations are London, Benson, Dungeness, Portland Bill, St. Anne's Head, Spurn Head,

Holyhead, Donaghadee, Malin Head, Wick, Yarmouth, Scilly, Eskdalemuir. The service began on September 11th for Roehampton, was discontinued on September 15th, and was resumed on September 23rd for Shepherd's Bush, and subsequently for Farnborough and Kingsnorth. It is now to be extended to all Naval Air Stations. Additional reporting stations are being sought.

The service at the Office, which has required attendance from 3 a.m. to 4.30 a.m., has been taken by Mr. Lempfert and Mr. J. S. Dines. Mr. Goldie has now been brought up from Falmouth as relief, and has been in joint-charge of evening forecasts for some time.

8. *Other reports.*—The daily charts of the Weekly Weather Report and the Atlantic Charts have been discontinued partly for lack of data and partly out of regard for the instructions of No. 6.

9. *Financial effect.*—The charges for telegrams will be affected by these changes in various ways. They are increased by the sending of telegrams "en clair," and by the additional stations of the Daily Weather Report, and by the 3 a.m. service. They are diminished by the suspension of the wireless reports from ships and by the suspension of the international exchange. It has not been possible to estimate the net effect.

10. *Staff.*—Mr. A. E. Gendle was in training with the Territorial Force at the outbreak of war, and was retained with the Colours. The terms as to the maintenance of civil pay prescribed by the Government for the corresponding circumstances in the Civil Service were sanctioned in his case.

Applications for leave to join the Forces have been received from

A. A. Lovie	Division I.
N. C. Bradnock	„ II.
W. B. Greening	„ I.
F. C. Levin	„ IV.
J. L. Gray	„ I.
R. Pyser	„ II.
L. H. Powers	„ III.
W. J. Tomkins	„ III.
E. L. Ardley	„ 0.
P. N. Skelton	Eskdalemuir.
H. G. Harris	„
B. G. Brame	Kew.

Permission has been given for enlistment on Civil Service terms to A. A. Lovie, N. C. Bradnock, W. B. Greening, F. C. Levin, and J. L. Gray. B. G. Brame was pronounced inadmissible two years ago on account of health. P. N. Skelton has been refused on account of eyesight. Instructions are required for the others.

H. W. Braby, on leave, announced his intention of joining the Royal Army Medical Corps and asked for his place to be retained.

Mr. L. F. Richardson, Superintendent of Eskdale Observatory, has repeatedly asked leave to join a Red Cross unit or the ambulance corps, but so far permission has been declined.

It was agreed, with reference to the requests from Holland and Sweden, that the Committee are unable to devise a form of telegraphic weather report from stations in this country which will meet the objections of the Censor.

Authority was given to issue the Daily Weather Report daily fourteen days after date, together with copies of Forms 202, 216 for the current day.

A draft letter to the Commissioner of Police asking for the name of an Officer who might be consulted by telephone as to the name of any person making suspicious enquiry for meteorological information by telegraph or telephone was approved.

479. Office and Observatory Staff.—(Minute 471).—Reported—that in addition to those absent on military service the staff was reduced by the resignation of H. W. Hewitt, who became a ship's steward, M. H. Megrah and W. R. Berry, who found employment in banks; H. J. Dormer, who was transferred to the Treasury, and Miss Wigley, who was taken on temporarily *vice* H. L. B. Tarrant, ill, and retained in place of Miss Powell after he returned. The details of the promotions and new appointments which have in consequence been made are set out below :—

Promotions.—Reported—the following promotions on the staff of the Office :—

N. C. Bradnock, boy clerk, promoted to be probationer in the Forecast Division with special reference to the Telephone Service, from 20th July. (Order 300.)

A. J. Tabor, boy clerk, promoted to be probationer in the Marine Division, from 1st July. (Order 301.)

Transfer.—Also the transfer of B. G. Brame, of the Instruments Division, to Kew Observatory on 3rd July, in place of F. Levin, transferred to the Instruments Division. (Order 308.)

New Appointments.—Reported—the following new appointments :—

Mr. E. V. Newnham, B.Sc., of Bedale's School, Hants, and of Bristol and Birmingham Universities, to be graduate assistant to date from 12th September at a salary

of £60 a year, replacing Mr. H. W. Braby, M.A., who, at his own request, was relieved of duty on 1st September. (Orders 333, 335.)

F. L. Bristow, born March 5th, 1898, of Holloway County Secondary School, to be probationer in the Marine Division from 20th July, 1914, replacing E. L. Clinch transferred to Secretarial Division. (Order 300.)

C. C. Newman, born 12th October, 1897, of Kilburn Grammar School (London Matriculation), to be boy clerk in the Statistical Division from 31st August, becoming probationer on attaining the age of 17 years on October 12 ; to replace M. H. Megrah, boy clerk, who had resigned on receiving another appointment. (Order 331.)

R. M. Poulter, born 26th August, 1897, of the Owen's School, Islington (London Matriculation), to be probationer in the Secretarial Division from 17th August, in succesion to H. J. Dormer who had been appointed clerk in the Treasury. (Order 327.)

George Barker, born 12th January, 1897, now in the employ of Mr. Wm. Northey, Lawrence Lane, Cheapside, E.C., to be boy clerk from 19th October, upon the result of an examination held on 28th September.

The above appointments to boy clerkships and probationerships are on the usual terms.

Miss P. Wigley to be shorthand typist and to assist with other office work as directed from 7th September at a salary of £70 a year. (Order 334.) Miss Wigley held a temporary appointment, at 30*s.* a week, from 23rd June to 6th September, during the absence of Mr. H. L. B. Tarrant, on sick leave. (Order 306.)

G. R. Parker, born 17th July, 1900, to be office boy at 7*s.* 6*d.* per week from 21st July, rising to 10*s.* a week after six months' approved service, to replace H. W. Hewitt, resigned. (Order 317.)

R. E. Prideaux, born 24th July, 1900, to be boy messenger at 7*s.* 6*d.* per week from 27th July, rising to 10*s.* a week after six months' approved service, to replace J. Alder, who had not reported himself for duty since 16th July. (Order 320.)

Reported further—that authority (Order 322) had been given on 4th August to the Superintendent of Kew Observatory to employ, until further order, a labourer to assist the caretaker in the care of the grounds and buildings of the observatory, on weekly wages at 25*s.* a week.

Professional Assistants.—Reported further—that Mr. L. H. G. Dines's salary was increased to £230 from 1st October, 1914, as determined in the estimates for 1914–15. (Order 338. *See* Minute 413.)

Also—the extension of Mr. E. H. Nichols's appointment (Minute 421) until 31st March, 1915, at a salary of £140 as from 1st October, 1914. (Order 342.)

480. Observatories.—Kew.—*Cost of repairs.*—Reported—that the cost of internal repairs, &c., at Kew Observatory, carried out by the Office of Works in connexion with the structural alterations, amounted to £225 10*s.* 7*d.*, and that this amount had been paid to the Office of Works on 24th July, 1914, in compliance with a renewed demand, although there was ground for difference of opinion as to the incidence of certain items of the final account of the contract for the alteration of the building.

Approved.

Destruction of old papers.—Reported that, in company with Capt. Lyons, Chairman of the Gassiot Committee, the Director had visited the Observatory and had given instructions for the destruction of a quantity of old papers.

Night-watchman.—Reported—that the Office of Works had installed a night-watchman at the Observatory on 16th May to be on duty each night from 8 p.m. to 8 a.m., in lieu of a constable formerly provided. The necessity for supervision at night arises on account of the outbuildings which are separate from the main building.

In view of changed conditions since the beginning of war, the Office of Works now suggest that a night-watchman may no longer be necessary, and invite an expression of opinion upon the point.

On the other hand there is no supply of water at the Observatory during the night hours at present, so that the risk of damage by fire is considerable.

It was agreed that as between the provision of a night-watchman and of a supply of water, the preference for the water supply be indicated. (*See* Minute 444.)

Reception (Minute 474).—An afternoon reception was given by the Director and Superintendent with Mrs. Shaw and Miss Chree on 14th July, and was attended by about 200 guests.

Eskdale.—*Provision of cottages and Post Office.*—Reported—that correspondence had passed between the Office and the Post Office with reference to the provision of a Sub-Post Office at the Observatory ; and that the following letter had been received from the Treasury, in reply to the letter printed in Minute 444 :—

2419/14.

Treasury Chambers,
10th September, 1914.

SIR,

WITH reference to your letter of the 2nd February last (9/ CE. 20), I am directed by the Lords Commissioners of His Majesty's Treasury to say that in present circumstances they are unable to assent to the erection of additional cottage accommodation at Eskdalemuir.

As regards the question of the local postal arrangements, my Lords understand that the opening of a Scale Payment Sub-Post Office near the Eskdalemuir Observatory for the transaction of postal and telegraph business is warranted, but that the Postmaster General cannot find any one in the village to act as Sub-Postmaster, and the opening of an office is dependent therefore on a suitable person with suitable premises being found by the Meteorological Committee. To such premises telegrams could be transmitted by telephone over existing circuits, and the Sub-Postmaster would have to undertake their delivery. The remuneration payable to the Sub-Postmaster would be at the rate of £21 16*s.* a year. In addition to this he would receive remuneration for the delivery of telegrams at the following rates :—

	s.	*d.*
Under ½ mile	0	1
Between ½ mile and 1 mile	0	2
„ 1 „ 1½ „	0	4
„ 1½ „ 2 miles	0	6
„ 2 „ 3 „	0	9
„ 3 „ 4 „	1	0
For each additional mile	0	3

The hours of business at such an Office are usually from 8 a.m. to 8 p.m.

The opening of such an Office would not, however, in itself afford any means of improving the delivery and collection of letters in the district.

I am, &c.,

T. L. HEATH.

The Director,
Meteorological Office.

Inquiries are now being made as to the practicability of opening a Sub-Post Office in the present Observatory buildings.

Repairs to acetylene plant.—Reported—that the Office of Works had forwarded an account for £40 19*s.* 4*d.* in respect of repairs to the acetylene plant at Eskdale. The work had been undertaken after inspection of the plant by a representative of the Office of Works. The amount had been paid on 21st October, after the Office of Works had stated that, owing to a misapprehension, the Committee had not been consulted before the work was taken in hand. The Treasury had decided in February, 1907, that the expense of external and structural repairs should devolve upon the Office of Works, while the Royal Society should be responsible for internal repairs and maintenance as well as for heating and lighting.

Approved.

Valencia.—*Retirement of Mr. Cullum.*—Submitted—the following report :—

The Superintendent of the Valencia Observatory reaches the age of 65 years in the current financial year, and it has been decided that he shall be retired in accordance with the regulations for superannuation, on March 31st, 1915 (Minute 474).

The superannuation fund, initiated by the Meteorological Council in 1899, has provided the necessary superannuation allowances, eleven in number, from that year to the present. It is now depleted so that any new allowance to a retiring official must be a charge on the current grant. Besides the pension of the late Secretary, £400 a year, four of the eleven pensions have been, for special reasons, made chargeable on the grant, and of these two have lapsed. The two still chargeable amount together to £133 a year, which in the Estimates and accounts is set off against the normal contribution of £750 to the fund. The salary of the Superintendent at Valencia is £275 a year with a house, and recently £12 a year derived from a special trust fund has been added in consideration of magnetic observations.

Mr. Cullum has been in charge of the Observatory from August 1875, at first on emergency duty as Kew assistant, taking the place of the Rev. T. Kerr who died on 22nd August, 1875, and subsequently as Superintendent appointed 1st November, 1875, and accepted 27th November, 1875, at £150 rising to £200.

The nomination of a new superintendent rests with the Gassiot Committee. The outgoing Superintendent was rated as a first-class clerk receiving the use of house rent free in addition to his salary.

Something more on the lines of the present arrangement at Falmouth is desirable for the time being. The officer in charge should be graded as Meteorologist and replaced from time to time.

Superannuation Allowance (Minutes 1886–7, p. 98).—Mr. J. E. Cullum was appointed Superintendent of the Valencia Observatory on 1st November, 1875, having been previously employed at Kew Observatory.

Following the precedent of Mr. Rigby's case, the service at Kew would be allowed to count, and Mr. Cullum's "approved service" would be reckoned at 40 years, the maximum allowance for which is one-half of the average salary of the past three years.

Allowing the payment of £12 for magnetic observations under Superannuation Regulation (2) the annual salary is £287 and the maximum allowance £143 10*s*.

It was agreed that the vacancy be reported to the Gassiot Committee with a view to asertaining the views of the Committee upon the various points arising in connexion with the appointment of a Superintendent.

Central Observatory for the Investigation of the Upper Air.—Submitted—the following report :—

1. *The present provision for the Investigation.*—Since 1905 a sum of £450 has been assigned by the Meteorological Office for the experimental investigation of the Upper Air in this country. The work has been in the charge of Mr. W. H. Dines, F.R.S.

A number of other institutions and private persons have been active in co-operation with Mr. Dines, and the scientific results obtained by the co-operation are a subject for warm congratulation. The published work of Mr. Dines, Mr. Cave, Mr. Gold, and Miss White and others, take high rank among the publications on the subject. It includes three reports on the Free Atmosphere of the British Isles, and Mr. Gold's prize essay on the International Kite and Balloon Ascents published by the Office ; one paper in the Philosophical Transactions and one in the Proceedings of the Royal Society ; a book, and a lecture before the Royal Institution ; a paper in the Proceedings of the Royal Society of Edinburgh, and one in the Journal of the Scottish Meteorological Society ; numerous papers in the Quarterly Journal of the Royal Meteorological Society, with one Presidential Address.

Out of the £450 a year Mr. Dines has received £200 as honorarium, and the remaining £250 has been spent at his discretion, the greater part of it being required for the payment of a mechanical assistant, who now makes the special apparatus for aerological work.

2. *The development of the Investigation.*—When the Investigation was commenced in 1905 the chief instrument of investigation was the kite, with which it is possible to explore the atmosphere and ascertain the temperature, humidity, and wind velocity up to about 6 kilometres (20,000 feet). Subsequently the registering balloon was adopted in addition, by which temperatures, and to a certain extent humidity, could be ascertained up to 20 kilometers or more (70,000-80,000 feet) ; and now the pilot balloon watched by theodolites has become the usual means for determining the direction and velocity of air currents at different levels.

The most striking result of the investigation of the upper air is the division of the atmosphere into two layers with characteristic properties ; the inner or lower layer, the troposphere, about 10–15 kilometres (30,000 to 45,000 feet) thick, comprising about three quarters of the whole atmosphere, and the upper layer, the stratosphere, above the highest cloud level. The investigation of the strata on either side of the boundary between the troposphere and the stratosphere, the region of transition, has become a very attractive subject of research for which registering balloons are a necessity, and pilot balloons are occasionally useful. It is, however, outside the ordinary range of the aeroplane and the manned balloon, and consequently the investigation of the higher regions, which is of primary importance for meteorological science, has to be distinguished from the investigation of the lower regions, which has its immediate practical application in the flying schools. For this latter pilot balloons are frequently in use. Kites might be used, but as a means of aerological research kites have fallen into disuse in this country, partly from the fact that the results for the elements which are most easily registered, temperature and humidity, have been found not to lend themselves effectively to classification, but mainly from the risk which is run with a great length of steel wire either in the path of an aeroplane or across a line of route of motor cars.

3. *The Aeronautical and Aerological Aspects of the Inquiry.*—The investigation of the lower strata for the Meteorological Office in accordance with international programme by means of pilot balloons, has now become part of the routine of the observations at South Farnborough, Falmouth, Eskdalemuir, and Aberdeen. The investigation of the turbulence of atmospheric motion is also a proper subject for these stations. The investigation of the upper strata is the special concern of meteorologists, and has only an indirect application upon the practice of the flying school.

4. *Requirements of Site and Equipment.*—A most important consideration is the locality to be chosen for the Observatory, because the inquiry is conducted by means of instruments carried by registering balloons which are lost altogether if they drop into the sea, but are returned by the finder, as a rule, if they fall on land. No direction of drift can be ruled out as beyond the limits of possibility, and consequently the site which is as distant as possible from the sea in any direction is *primâ facie* the best.

The essential elements of an aerological observatory are a workshop for the manufacture, repair, and adjustment of instruments, a laboratory for the manipulation of hydrogen balloons and the calibration of the instruments, a computer's office for storing, tabulating, and working up the records, and open space for manipulating the balloons, and theodolites for watching them. The site selected must be at a sufficient distance from the sea in every direction, and it is a great advantage for it to be outside the atmospheric influences of large towns.

The auxiliary equipment of such an Observatory consists of :—

(1) The usual equipment of a Meteorological Observatory for ascertaining the surface conditions during the various soundings. A free exposure for wind is specially desirable, and also a free outlook for the observation of balloons as well as of clouds, their motion and transformations.

(2) Kite gear and other appliances for examining the conditions of the atmosphere for at least the first kilometre of height (3,300 feet). Up to this height kites may be worked without serious risks to motor cars and other road traffic, but the kite wire remains an invisible danger to aeroplanes.

5. *The Site proposed by Mr. Dines.*—Mr. Dines began his aerological work with investigations by means of kites, using his house and premises at Oxshott as his base. In 1906 he moved to Pyrton Hill, Watlington, on the north-western slope of the Chiltern Hills, and has now acquired for the purpose a property at Benson, in Oxfordshire, which is in the plain of the Upper Thames near its confluence with the Thame, 3 miles from the Great Western Railway Station at Wallingford, on the high road from Henley to Oxford, and about 12 miles distant from either of those towns. He now desires an expression of the views of the Meteorological Committee as to the establishment there of an aerological station which would be permanent; that is to say, which could be carried on by the Office independently when the time comes for the present personal arrangement to be terminated. For this purpose an understanding as to ownership and occupation of the property would be necessary.

6. *Consideration of the Benson Site.*—For a satisfactory answer to this question a number of considerations must be taken into account.

First, the proposal must be put into a more definite form. The property which Mr. Dines has acquired is shown in the accompanying section of the 25-inch ordnance map. It consists of a house and garden (with a cottage between them and the high road) and a 5-acre field in the rear. It is proposed that the buildings forming the Observatory should be placed in this field; a workshop, gear shed, and anemometer tower are already in use or in course of erection. Access to the field is obtained from the garden, or independently from a drift-way leading from the high road to a dairy farm, the land of which surrounds the field on the south and east, and is accessible at present for the purposes of the Observatory. The proposition is for Mr. Dines to retain the use of the house, cottage, and garden, and to undertake to make over to the Office when called upon the right of occupation of the field at £10 a year. Mr. Dines is further willing to give the Office the option of acquiring the whole property after the death of himself and his wife, at a valuation based on £1,700 as the present value. To complete the Observatory buildings in the sense indicated above, the workshop, which has been erected at a cost of about £60, would have to be supplemented by two similar erections for a laboratory and an office respectively. Certain domestic offices would also be necessary.

7. *Estimate of establishment and annual expenditure of an Aerological Observatory.*—Having regard to the high qualifications necessary, and the other duties which are indicated later, the staff required for such an establishment would be :—

	£
(1) A *Director of Investigations* of the Upper Air for the Meteorological Office, at a salary of from £500 to £650 a year	500–650
(2) A *Professional Assistant*...	125–200
(3) A *Mechanical Assistant*, who (in special circumstances) would be graded on the Office staff, with a maximum of £200 a year, with the usual superannuation provision...	130–200
(4) A *Clerk Computer*, who would also be on the graded staff, say £75–£110, beginning perhaps with a boy at 14*s.* to 20*s.* per week	40–110
(5) Some provision, say 5*s.* to 10*s.* per week, for attendance, which could be arranged locally	13–26
(6) At present about £100 is available for consumable stores and incidental expenses; this has been supplemented by the proceeds of the sale of apparatus. The use of Mr. Dines's premises has been an exceptionally economical arrangement. The vitality of the institution depends upon this item, and the allowance, inclusive of upkeep, lighting, heating, &c., ought to be	250

The cost of an Observatory on this scale might therefore be estimated at from, say £1,050 to £1,450. Ultimately the house and cottage would be available for the accommodation of part of the staff, and additional accommodation could easily be found in the village of Benson.

8. *Other purposes of an Observatory at Benson.*—The primary purpose of this establishment would be the investigation of the upper air, particularly the layers above 4 kilometres (14,000 feet), which are beyond the range of ordinary aeronautical work. The region in question is known to have a dominant influence upon the distribution of pressure at the surface, and therefore in a general sense controls our weather. The investigation must therefore be regarded as an essential part of general Meteorology.

There are, however, other meteorological investigations for which the establishment proposed would afford a suitable base.

(1) The site is in a wide river plain in an agricultural region where the phenomena of ground frosts, and alternatively, land fog, can be studied with greater freedom from the influence of large towns than at any other of the establishments of the Office.

(2) The introduction of wireless apparatus has made it possible to obtain indications of distant lightning, and an organised investigation is called for into the phenomena of thunderstorms as affecting trees and lightning conductors, with their accompaniment of hail and other striking phenomena. For the time being the association of this work with the investigation of the upper air under the guidance of a fully competent meteorological

investigator is the most suitable means of getting an insight into the problem for the following reason. One of the most noticeable characteristics of the occurrence of of thunderstorms is their wide sporadic distribution on many occasions, in spite of their very local character. They occur in different parts of the country on successive days, though the localities of occurrence on successive days cannot be regarded as connected by "travelling" in the ordinary sense. The best indication of the probability of a thunderstorm in any locality at present is that a thunderstorm has already been noted somewhere else on the map. This points to some general characteristic difference between the upper and lower layers on otherwise similar occasions which ought to yield to skilful investigation.

The Benson Observatory would be the best of the Office establishments for the special investigations here mentioned. The other establishments are as follows :—

Kew Observatory.—The central establishment and weather station for London.

Eskdale Observatory.—The magnetic observatory and meteorological establishment for moorland conditions at 800 feet.

Valencia Observatory.—For the study of atmospheric conditions on the Atlantic seaboard.

Falmouth Observatory.—For the study of atmospheric conditions at the mouth of the English Channel, and of the application of meteorology to the needs of seaports and seamen, particularly yachtsmen and coasters.

Aberdeen Observatory.—For the study of atmospheric conditions in the North Sea.

South Farnborough.—For the study of the turbulence of atmospheric motion, and for the application of meteorology to the needs of aircraft.

None of them is so well suited as Benson for the study of the upper layers of the atmosphere, and of the application of meteorology to agriculture. In this case the application of meteorology should be understood to include the distribution of information for the benefit of farmers, just as at Falmouth the study of the application of meteorology to the needs of seaports includes the exhibition of forecasts and the critical observation of the work of the Office in that direction by a member of its own staff.

9. *The application of Meteorology to Agriculture.*—In this case the work would be connected with that of the Statistical Division of the Office, and the use of statistical methods, as well as with the work of the Forecast Division.

The establishment of such a relationship with the Statistical Division would be specially appropriate, because Mr. Dines has found that statistical methods furnish the most effective way of dealing with the observations of the upper air, and has obtained thereby results which are of the highest importance, and compare most favourably with those obtained in other countries at much greater cost.

In the earlier stages of the history of the Office, provision for collecting information was alone considered, but now after many years of collection the study of the application of the information with a critical examination by a member of the staff may be frankly recognised as desirable with a view to the success of the office work. Circumstances have recently pointed to the practical necessity for an office in Liverpool to study the distribution to ships of the information collected by the Marine Division, and its application. Such an office, which might be in some sort of connexion with the Liverpool Observatory, would, with Benson, complete the organisation for the study of these applications : Kew and South Kensington representing the application of Meteorology to the life of large towns, Falmouth to seaports, South Farnborough for aircraft, Benson for agriculture, and Liverpool for ocean-going steamers.

For the purpose of the local distribution of information about the weather, the observatory should be in communication with the general telephone system. We have applied from time to time for assistance in distributing forecasts by telegraph to rural villages. So far we have been unsuccessful in obtaining the means for carrying out the project. Benson is a typical rural community, and the regular exhibition of a forecast there would elicit an answer to the question whether it is desirable to pursue the matter further. In course of time the local farmers would either come to use it or decide to disregard it, and the observation of an expert meteorologist on the spot would supply the reason for the conclusion and suggest a more effective method of treatment.

The opportunity which Benson affords for the study of atmospheric conditions specially affecting agriculture, and of the work of the Office in relation to agriculture, may be held more than to counteract its lack of elevation. For an Aerological Observatory some commanding eminence has generally been sought, but a commanding situation, though very impressive for the visitor, is not really necessary for the investigator. So far as investigations with kites are concerned the site of Eskdalemuir could hardly be improved upon, and for registering balloons, or pilot balloons, a clear atmosphere is necessary, and the absence of obstruction which subtends a greater angle than 5° is sufficient, and these the locality of Benson will afford.

One objection may be taken to its position, and that is, that it is not sufficiently far from the South Coast. From that point of view, a position further to the north-west, such as the neighbourhood of Birmingham or Shrewsbury, would be preferable. Birmingham has been ruled out on account of atmospheric pollution. No site is offered near Shrewsbury, but in this connexion it may be remarked that there is a station at Shrewsbury which is in urgent need of reorganisation, and perhaps some chance of co-operation might be arranged.

10. *Relation of the Aerological Observatory to other Observatories.*—Benson is in the Thames valley, 45 miles from London and 12 miles from Oxford. Kew is also in the Thames valley, and the relation of the proposed observatory to both Oxford and Kew needs consideration. The University of Oxford makes no provision for the study of Meteorology, but the Radcliffe Trustees, a corporation independent of the University, maintain the Radcliffe Observatory for astronomical work, and like other astronomical observatories it has maintained for nearly a century regular meteorological observations. Since the time when Mr. E. J. Stone was a member of Meteorological Council the Radcliffe Observer has had in operation the spare set of self-recording instruments obtained in 1868 for an eighth

observatory of the Kew type. A telegraphic reporting station, somewhat short of complete, was maintained at the Radcliffe Observatory from the commencement of the Office work until the end of 1912, when it was given up because it could not undertake observations at 7 a.m. or 6 p.m.—the official hours. The payment to the observer—£16 3*s.* a year, a perennial subject of rather acrimonious discussion between the Observatory and the Office, has been continued for the time being in consideration of the Observatory continuing its contributions to the Weekly and Monthly Reports. The Office is peculiarly vulnerable with regard to the Weekly Report, because it has compiled a body of *statistics for districts*, and the discontinuance of a station without an equivalent substitute implies a fatal break in the continuity of the statistics. But Benson would be a proper equivalent for Oxford, and if thought fit the subvention might be diverted.

At the same time it is clear that Kew, Benson, and Oxford ought to be brought into co-operative relation, and if Benson continues to be served by a Meteorologist of the first rank, negotiations ought to be opened with the University with a view to getting the subject recognised there by a Professorship, or in some other manner.

The relations with Kew may be left to be evolved by the direction of the Office as circumstances indicate.

It was agreed that the subject be further considered at the next meeting.

481. Royal Meteorological Society.—(Minutes 315, 402).—Read—the following report :—

Climatological Atlas.

Report of the Royal Meteorological Society and the Meteorological Office Joint Committee.

The Joint Committee have considered the question of the publication of the Climatological Atlas, and they think it desirable that the Atlas should be in two volumes. The following list of Contents has been drafted for inclusion in a Prospectus :—

Contents of Vol. I.

Plates 1–17.—Mean Monthly and Annual Pressure. Special cases of exceptional distribution.
Plates 18–26.—Diagrams showing Mean Wind Direction at different Stations for each month and the year.
Plates 27–40.—Maps showing isopleths of per cent. Wind Direction for each quadrant; for each month and the year.
Plates 41–44.—Maps showing frequency of Wind Force (Beaufort Scale) for each quadrant at certain Stations.
Plates 45–57.—Average duration of Sunshine for each month and the year.
Plates 58–60.—Maps showing per cent. of actual Sunshine and possible during January and July, also special cases of anomalous Distribution of Sunshine.
Plate 61.—Diagram showing Diurnal Variation of Sunshine.
Plates 62–74.—Mean Monthly and Annual Amount of Cloud at 9 a.m.
Plates 75–87.—Mean Monthly and Annual Amount of Cloud at 9 p.m.

Contents of Vol. II.

Vol. II will contain series of Monthly, Annual, and Special Maps showing Distributions of Temperature, Relative Humidity and Rainfall.

The work relating to Pressure and Wind has been completed as far as possible.

When certain inconsistencies between results from neighbouring stations have been fully examined, the averages will be made ready for entering on the forms for printing, and the maps and other illustrations prepared.

The amount of Cloud has been extracted for such stations as are available during the period 1885–1910, and provisional maps have been prepared showing the mean monthly and annual Amount of Cloud at 9 a.m. and 9 p.m.

The material for Maps showing sunshine is being dealt with by the Meteorological Office, which will, it is understood, supply the Committee with necessary data.

The Chairman is in communication with Dr. H. R. Mill, who has expressed willingness to co-operate with the Committee in the preparation of the rainfall maps.

H. N. Dickson,
Chairman.

24th October, 1914.

The payment of £50 to the Royal Meteorological Society for the second year, in accordance with Minute 315, was authorised.

British Rainfall Organization.—Read, letter 3786 from Dr. H. R. Mill, with reference to the introduction of millimetres as well as inches for the representation of rainfall in the annual table of the volume of "British Rainfall," and a further communication dated 26th October, 1914 (4361) after an interview, as follows :—

"I may also put forward the suggestion that I made to you personally some weeks ago, that I should be willing to give in the general table of 'British Rainfall,' the total rainfall in millimetres as well as inches, if a grant could be secured to meet the increased expense of printing 'British Rainfall' in a larger *format*. This question will not become urgent for some six months or so, but I should be glad if you would consider the matter."

It was agreed that the matter be considered in the discussion of the estimates, and that inquiry be made as to the probable cost.

482. PUBLICATIONS. — **Programme of Publications.** — Submitted — the following Programme of Publications for 1915–16 :—

PROGRAMME OF PUBLICATIONS FOR 1915–16.

Periodical :

Daily Weather Report (1916) (900 to 950).
Monthly Meteorological Charts of the Atlantic Ocean (1916) (600 + 275).
Do. do. do. Indian Ocean (1916) (350 + 200).
British Meteorological and Magnetic Year Book :
Part I.—Weekly Weather Report (1916) (375 + 75).
(The charts should be enlarged to full-page charts, which will double the lithography).
Appendix I.—Quarterly and Annual Summary (375 + 75).
Appendix II.—Weekly and progressive totals of Rain days, Rainfall, Temperature, and Sunshine (375 + 75).
Appendix III.—Annual Summary of Gales and Wind recorded at anemograph stations in the British Isles (375 + 75).
Part II.—Monthly Weather Report (1916) Monthly Summaries (600 + 100 + 750 for Royal Meteorological Society + 125 for Scottish Meteorological Society + 25 each of two plates).
Annual Summaries (700 + 100 + 750 for Royal Meteorological Society + 125 for Scottish Meteorological Society + 25 each of two plates).
Part III (1).—Daily Readings at Stations of the First and Second Order (1916) (250) with Annual Review (4 pp.).
(2).—Geophysical Journal (1915) (400) with Annual Review of the results of the Investigation of the Upper Air, (8–12 pp.).
Part IV.—Hourly Values from Autographic Records (1914) (400).
Part V.—Climatological Report for the Globe (1912) (500).
Observer's Handbook, 1915 edition (100 + ?).
Summary of Maritime Weather Signals at present in use in the various countries of the Globe (1915 edition) (100).
Calendar, with Notes and Diary for the use of Observers, for 1916 (500).

Occasional :

Geophysical Memoirs. Various numbers are in contemplation or preparation, including " The Seasons in the British Isles " (500 + 100).
Atlas of Tropical Hurricanes (500 + ?).
Tabulator's Handbook (500).
Computer's Handbook (500).
Memoir on the Distribution of Ice (if not already completed).
Twelve Monthly Charts of the South Atlantic Ocean (M.O. Press).

Under Consideration :

Climatological Atlas of the British Isles.

NOTES.

Year Book.—The changes proposed are the following :—

(1) The charts of the Northern Hemisphere which form one half of the issue of the Weekly Weather Report are too small in scale. It is proposed to double the scale and use a whole page for each chart. The preparation of the charts is, however, suspended for the present on account of the war.

(2) The Climatological Report for the Globe should enter in its second year with the data for 1912. This assumes that the material for 1911 can be sent to the printer before the 31st March, 1915, which is doubtful.

(3) The practice of issuing quinquennial appendices to the Weekly Weather Report makes it difficult for the general public with a List of Publications as its guide to know what climatological material is available. It is proposed, therefore, to make these quinquennial appendices, such as the " Normals for the British Isles " now in the press, a separate publication in the form of a handbook, or a number of the Geophysical Memoirs, according as the more convenient size of publication is octavo or quarto. The tables will then be separately indexed in the list of publications.

Price of Publications.—Read—the following letter from Sir J. Larmor, M.P. :—

St. John's College, Cambridge,
3rd October, 1914.

MY DEAR SHAW,

THANKS for the Geophysical Journal for 1912.

But some remonstrance is due on behalf of the scientific public who are supposed to use these collections of data for the progress of science. The absurd price of 10*s.* for 100 pages will effectually defeat that object, by keeping the book away from the possession of everybody who cannot obtain a presentation copy. I know that an Estimates Commitee of the House of Commons started this policy. I tried to influence some of its members in vain ! More public remonstrance seems to be needed.

Yours very truly,
J. LARMOR.

483. ESTIMATES FOR 1915–16.—Submitted—the following materials for estimates for the year 1915–16 :—

METEOROLOGICAL OFFICE.

PROVISIONAL ESTIMATE OF CHARGES UPON THE GRANT FOR 1915–16. SCHEDULE I

Service.	Voted 1913–14.	Spent 1913–14.	Voted 1914–15.	Proposed 1915–16.	Totals.
	£	£	£	£	£
Salaries (*see* Schedule II.) :—					
Office	13,458	13,524	14,342	11,463	
Observatories				3,872	15,271
Insurance				45	
Office Expenses:					
Rent, Heating, and Lighting	735	689	700	700	
Furniture and equipment	150		200	100	
Library				50	
Insurances, Repairs	210	500	250	100	
Incidental Expenses and Consumable Stores				190	1,140
					60
Stationery Office (S.O.P.)	50	88	—	60	
Post Office Charges:					
Postage	660	727	670	750	750
Telephones	60	43	78	78	78
Telegrams from inland stations	560	586*	600	600	
„ wireless messages	340	356*	340	350	
„ from abroad	890	523*	550	525	
„ sent abroad	525	600*	530	600	
„ Storm Warnings	350	336*	350	350	
„ Harvest Forecasts	65	123*	80	120	
„ sundry messages, &c.	100	246*	130	130	
Allowances to Clerks	210	219*	210	220	2,895
Travelling Expenses	400	445	380	400	400
Superannuation:					
Pensions not chargeable on Fund	425	425	425	425	
„ chargeable on Fund	209	194	209	275	
Annuities	862	821	1,012	1,012	
Contribution to Fund	352	541	541	475	
					2,187
					22,890

* Estimated from 11 months' payments.

PROVISIONAL ESTIMATE OF CHARGES UPON THE GRANT FOR 1915-16—*continued.* SCHEDULE I.—*continued.*

Service.	Voted 1913-14.	Spent 1913-14.	Voted 1914-15.	Proposed 1915-16.	Totals.
	£	£	£	£	£
Brought forward ...					22,890
Purchase of Instruments:					
Royal Navy	510	912	700	900	
For Office use	300	2,484	450	450	
Other commissions	1,650		1,500	1,000	
					2,350
M.O. Observatories (excluding salaries) (*see* Schedule III.):					
Kew	525	537	360	412	
Eskdale	365	850	405	500	
Valencia	168	147	116	240	
Farnborough	85	75	100	125	
Falmouth	250	*	150	220	
Benson	170	*	160	182	
					1,679
Edinburgh Office	350	350	350	350	350
Auxiliary Observatories and Stations:					
Subventions: Aberdeen	295	295	295	295	
Armagh	50	50	50	50	
British Rainfall Organisation	25	25	25	25	
Royal Meteorological Society	50	50	50	—	
					370
Salaries of Observers: Anemograph stations	70	45	70	670	
Telegraphic stations	650	575	600		
					670
Incidental Expenses: Cost of Forms, &c.	210	196	210	210	
Agents' Fees	110	75	75	105	
Labels	6	5	6	15	
Postage, telephones, and telegrams	—	—	—	10	
					340
Lectures and Experiments:					
Schuster Readership	350	156	350	350	
Lectures, &c.	50	1	25	—	
Contribution to International Publication	50	50	50	50	
					400
Total	—	—	—	—	29,049

* Figures not available.

APPROPRIATIONS IN AID. SCHEDULE I.—*continued.*

—	Voted 1913–14.	Realised 1913–14.	Voted 1914–15.	Proposed 1915–16.	Totals.
	£	£	£	£	£
Office Expenses Refunded:					
Departmental: Administration, &c.	125	128	160	150	
Forecasts	200	159	160	80	
Instruments	130	165	170	100	
					330
Incidental: Administration, &c.	60	99	50	50	
Forecasts and Daily Weather Report	400	493	450	510	
Instruments	5	28	25	25	
					585
Stationery Office (Sale of Publications)	50	58	50	50	50
Telegraphic Expenses Refunded: Home	220	361	235	235	
Foreign	380	452	380	380	
					615
Telephone Charges Refunded	—	—	50	50	50
Inspections	160	211	180	200	200
Instruments: Royal Navy	510	912	700	900	
Other sources	1,500	2,658	1,500	1,000	
					1,900
Superannuation: Interest on Fund	25	29	—	—	
Annuities	862	795	1,012	1,012	
					1,012
Lectures and Experiments: Schuster Readership	350	156	350*	350*	
Other sources	100	98	75	—	
					350
Observatories (*see* Schedule III.):					
Kew	590	781	565	570	
Eskdale	1,063	1,303	1,076	1,090	
Valencia	30	36	30	30	
Farnborough	—	254	315	315	
Falmouth	—	—	—	10	
Benson	—	—	—	—	
					2,015
Auxiliary Observatories and Stations (Cost of Forms)	90	108	111	111	111
Total	—	—	—	—	7,218

Net Total £21,831

* Annual figure.

PROVISIONAL STATEMENT OF CHARGES UPON THE GRANT FOR 1915–16 REQUIRED FOR WORK SANCTIONED FOR THE YEAR. (SCHEDULE II.).

SALARIES, including normal increases: OFFICE AND OBSERVATORIES (Salaries marked * are affected by Allowances).

Establishment.	—	Administration and Library.	I. Marine Division.	II. Forecast Division.	III. Statistical Division.	IV. Instruments Division.	Kew.	Eskdale.	Valencia.	Falmouth.	Farnborough.	Benson.	Total. 1915–16.
		£	£	£	£	£	£	£	£	£	£	£	£
	Director ... ... £800–£1,000	—	—	—	—	—	—	—	—	—	—	—	1,000
	Secretary	350	—	—	—	—	—	—	—	—	—	—	350
	Professional Staff:												
7	Superintendents	—	450	490	490	500	657	442	300	—	—	—	(7) 3,329
7	Senior Professional Assistants	—	—	300	—	—	—	238	—	—	II.	200	(3) 738
5	Junior Professional Assistants	152	—	(2) 353	—	—	152	—	—	II.	II.	—	(4) 657
1	Graduate Assistants	100	—	—	—	—	—	—	—	—	—	—	(1) 100
	Classified Clerical and Technical Staff:												
12	Chief Clerk and Assistants¶	(2) 490	(2) 488	(3) 940§	(3) 613	200	(2) 375	—	—	—	—	—	(13) 3,106
8	Clerks and Mechanical Assistants¶	(2) {150 / 133†}	(2) 288	(2) 345	(3) 425	143	—	—	—	—	—	—	(10) 1,484
8	Clerk Assistants¶	120	—	(2) 225	90	163	—	120	—	—	—	—	(6) 718
8	Clerk Computers¶	(4) 320†	(1) 88	(2) 226	—	83	75	101	—	75	—	—	(11) 968
	Additional Staff:												
	Mechanical Assistants	—	—	—	—	—	—	—	—	—	65	150	(2) 215
	Supernumerary Clerks	—	—	—	(2) 161	—	—	—	100	—	—	—	(3) 261
	Probationers	(3) 148	(4) 204	(2) 112	(2) 145	48	48	—	—	—	—	—	(13) 705
	Boy Clerks	—	—	—	44	—	44	37	—	—	—	—	(3) 125
	Office or Laboratory Boys...	38	—	—	34	—	—	16	—	—	—	—	(3) 88
	Allowance for Vacancies and Revision	30	—	—	—	—	75	—	125	—	—	—	230
	Office Keeper's Staff:												
	Office Keepers	(2) 198	—	—	—	—	—	—	—	—	—	—	(2) 198
	Storekeeper	100	—	—	—	—	—	—	—	—	—	—	100
	Caretakers	—	—	—	—	—	82*	135	—	—	—	—	(2) 217
	Messengers	(2) 120	—	—	—	63	65	58	39	—	—	—	(6) 345
	Boy Messengers	(3) 90	—	—	—	—	—	—	—	—	—	—	(3) 90
	Cleaners	(4) 122	—	—	—	—	—	45	33	—	—	—	(6) 200
	Watchman	28	—	—	—	—	—	—	—	—	—	—	28
	Lift Attendent	53	—	—	—	—	—	—	—	—	—	—	53
	Occasional Sunday Duty	—	—	—	—	10	20	—	—	—	—	—	30
	Insurance (National Health and Employers' Liability) ...	—	—	—	—	—	—	—	—	—	—	—	45
	Meteorological Office, Edinburgh (*See* Schedule I.)	—	—	—	—	—	—	—	—	—	—	—	—
	TOTALS £1,000	2,742	1,518	2,991	2,002	1,210	1,593	1,192	597	75	65	350	15,380
		Insurance, 45.		Office, 11,463.			Observatories, 3,872.						
	Army Pay at 7*s.* per week for six out of seven members of the Staff serving with the Colours.	—	—	—	—	—	—	—	—	—	—	—	109

† Female staff.

¶ Excepted from the provisions of the Insurance Act, 1911.

§ Three Senior Professional Assistants are graded as "First Class Clerks."

II. Included in Forecast Division.

M.O. OBSERVATORIES. SCHEDULE III.

Service.	Kew.		Eskdale.		Valencia.		Farnborough.		Falmouth.		Benson.	
	1914–15.	1915–16.	1914–15.	1915–16.	1914–15.	1915–16.	1914–15.	1915–16.	1914–15.	1915–16.	1914–15.	1915–16.
EXPENDITURE.	£	£	£	£	£	£	£	£	£	£	£	£
Salaries (*see* Schedule II.)	1,355	1,593	1,137	1,192	441	597	65	65	60	75	340	350
Subventions	—	—	—	—	—	—	—	—	30	30	—	—
Cost of Forms	*	40	*	60	*	10	—	—	—	—	—	—
Rent, Rates, and Taxes	25	28	45	50	73	11	—	—	—	—	—	—
Repairs and Insurance	70	50				50	—	—	—	—	—	—
Fuel and Lighting	75	87	100	120		15	—	—	—	—	—	—
Equipment and Instruments	65	100	50	100		100	—	50	—	60	—	100
Consumable Stores	60	15	60	20	†	5	†	10	52	52	—	60
Books, &c.	15	20	25	20	†	5	†	10	—	—	50	—
Incidental Expenses	50	50	45	35	30	10	100	5	59	23	110	10
Postage and Telegrams	†	5	†	30	13	14	†	40	9	35	—	12
Telephones	†	15	30									
Travelling and Motor Car Expenses	†	2	50	65	†	20	†	10	—	20	—	—
TOTALS (exclusive of Salaries)	360	412	405	500	116	240	100	125	150	220	160	182
APPROPRIATIONS IN AID.												
Subventions: Gassiot Fund	450	450	—	—	—	—	—	—	—	—	—	—
Parliamentary Grant	—	—	1,000	1,000	—	—	—	—	—	—	—	—
Rosse Fund	—	—	—	—	12	12	—	—	—	—	—	—
Advisory Committee	—	—	—	—	—	—	250	250	—	—	—	—
Grazing Rent	5	4	—	—	18	18	—	—	—	—	—	—
Rent of Rooms	—	—	76	76	—	—	—	—	—	—	—	—
Testing Instruments and Commissions	110	100	—	—	—	—	—	—	—	—	—	—
Other Expenses refunded locally	—	16	—	14	—	—	65	65	—	10	—	—
TOTALS	565	570	1,076	1,090	30	30	315	315	—	10	—	—

* Not estimated. † Included with "Incidental Expenses."

484. Directors' Report and Accounts :—

Reports of Work.—0. *Library, Réseau Mondial and Technical Inquiries* (June).—Library.—Current work. 120 authors' cards and 21 cross reference cards prepared.

76 books borrowed by Office Staff.

Alteration of Shelf mark in Catalogue, Authors' cards and Subject cards nearly completed for all books in Bay II.

Book plates placed in 866 volumes.

12 new pamphlet cases received and the unbound pamphlets placed in them and indexed.

Notices sent out to all borrowers requiring the return of all books before the end of July.

Number of Publications received.—765.

Inquiries :—Personal, 41 ; Letter, 37.

Receipts for Inquiries :—£3 17*s.* 10*d.*

Foreign and Colonial Returns.—Current work—41 manuscript returns received and registered.

Preparation of wind tabulations for St. Helena for January to April, 1914.

Preparation of lustrum average Forms for West African stations and making copy for Dr. Hellmann.

Miscellaneous :—Part preparation of meteorological data for St. Lawrence Pilot and for African Pilot, Part III., for the Admiralty.

Completing monthly and annual maps of temperature, rainfall and sunshine for Appendix IV. to the Weekly Weather Report, 1913.

Inquiry Assistants :—Miss Powell.—Revision of Circular 001/J. Preparation of humidity tables. Revising proofs of Geophysical Memoir No. 9 and 9th Report of Meteorological Committee.

Miss Smith.—Preparation of information for replies to various inquiries. Copying monthly and annual rainfall at Greenwich, 1815–1869, on to lustrum Forms. Copying data from West African Stations for Dr. Hellmann.

Preparation of data for St. Lawrence Pilot and African Pilot, Part III.

Miss Turney.—Preparation of litho. transfers for Monthly Weather Report. Roll Calendar for July. Lantern slides for Mr. Gold. Preparation of Diagrams for Shrewsbury Exhibition. Preparation of Forms for Printers.

(July).—Library :—Current work. 34 authors' cards and 4 cross reference cards prepared.

60 books borrowed by Office Staff.

All books borrowed were recalled during the last week in July.

Book plates placed in 31 volumes.

148 books received from binders, examined, press-marked and placed on shelves.

26 volumes of the Met. Zeitschrift (Duplicate set) prepared for and despatched to binders.

Number of Publications received.—739.

Inquiries :—Personal, 37 ; Letter, 45.

Receipts for Inquiries :—£3 10*s.* 6*d.*

Foreign and Colonial Returns :—Current work—57 manuscript returns received and registered.

Preparation of lustrum average Forms for West African stations and making copy for Dr. Hellmann completed.

Preparation of rainfall lustrum Forms for Saffi, Mogador, Antananarivo and St. Helena (Oakbank).

Miscellaneous :—Some progress made with the manuscript record of the publications received from various institutions and persons at home and abroad.

Revising monthly and annual maps of temperature, rainfall and sunshine for Appendix IV. to the Weekly Weather Report, 1913.

Part preparation of meteorological data for St. Lawrence Pilot and for African Pilot, Part III., for the Admiralty.

Inquiry Assistants :—Miss Smith.—Preparation of Information for replies to various inquiries. Copying data for West African Stations for Dr. Hellmann. Copying data for St. Lawrence Pilot and African Pilot, Part III.

Miss Turney.—Preparation of litho. transfers for Monthly Weather Report. Roll Calendar for August. Lantern slides for Captain Hepworth and Dr. Chree. Diagram of 100 years' Monthly Mean Temperature for Edinburgh (1801–1900). Tracings of various diagrams and anemograph records.

(August).—Library :—Current work—35 authors' cards, 3 cross reference cards and 135 subject cards prepared.

63 books borrowed by Office Staff. During the first week in August all books were recalled to the Library except some with Mr. Gold in Australia. The Library was checked as far as is possible. Alteration of shelf marks in Catalogue, Authors' cards and subject cards completed for all books in Bay II.

Number of Publications received.—430.

Inquiries :—Personal, 15 ; Letter, 35.

Receipts for Inquiries :—£1 11*s.* 4*d.*

Miscellaneous :—Preparation of Meteorological tables for St. Lawrence Pilot, for Admiralty, completed.

Part preparation of Meteorological data for African Pilot, Part III. List showing publications received from various Institutions and Private Persons ("Who's Who") completed.

Revision of monthly and annual maps of temperature, rainfall and sunshine for Appendix IV. to the Weekly Weather Report for 1913 completed.

Réseau Mondial :—Some progress made with preparation of tables for 1911.

Foreign and Colonial Returns :—133 manuscript returns received from foreign and colonial stations.

Inquiry Assistants :—Miss Smith.—Preparation of information for replies to various inquiries. Copying rainfall at Aldershot and Oxford (1854–1913) for A. E. Douglass, University of Arizona.

Preparation of data for East African Pilot, Part III.

Correcting Proof of Observer's Handbook, 1914 edition.

Miss Turney.—Preparation of litho. transfers for Monthly Weather Report. Roll Calendar for September. Preparation of various Diagrams.

(September).—Library :—Current work. 37 Authors' cards and 4 cross reference cards prepared. 44 books borrowed by Office Staff.

26 volumes of Meteorologische Zeitschrift for Lending Library received from binders, examined, and placed on Lending Library shelves. 11 volumes of British Meteorological and Magnetic Year Book, 1912, Pts. 3 and 4, prepared for and sent to binders. Alteration of shelf marks in catalogues, Authors' Cards and Subject Cards for all books in Bay III. and for some in Bay IV.

Number of Publications received.—453.

Inquiries :—Personal, 17 ; Letter, 24.

Receipts for Inquiries :—£2 5*s*.

Miscellaneous :—Part preparation of meteorological data for African Pilot, Part II., for the Admiralty.

Indexing of Meteorologische Zeitschrift, Vols. XV. to XXX., in the "Statistical Index."

Examination of six volumes of manuscript meteorological observations kept at Downing, Holywell, by David Pennant, 1794 to 1835, and partial reduction of the temperature observations. (*See p.* 455.)

Réseau Mondial :—Some progress made with the preparation of tables for 1911.

Foreign and Colonial Returns :—130 manuscript returns received from Foreign and Colonial stations.

Lustrum average sheets prepared for Nain, Labrador (for use in Reséau Mondial).

Inquiry Assistants :—Miss Smith.—Preparation of information for replies to various inquiries. Copying pressure and temperature data for Nain (Labrador) on to lustrum forms. Correcting proofs of Table of Contents of Geophysical Memoirs, also final revise of Observer's Handbook, 1914. Translating for Captain Hepworth extract from Drygalski's "Greenland Expedition" and summarizing part of translation.

Miss Turney.—Preparation of diagram of temperature at Greenwich. Cleaning and re-mounting London rainfall diagram. Preparation of Roll Calendar for October.

Publications (June—September).—New Publications.—The following publications have been received and issued :—

Ninth Annual Report of the Meteorological Committee, 1913–14.
Report of the Meeting of the International Meteorological Committee, Rome, 1913.
Geophysical Memoirs, No. 8.
Fourth Report on Wind Structure.

The following publications have been received, but have not yet been issued :—

Geophysical Memoirs, Nos. 9 and 10, also
Report on Work carried out by S.S. "Scotia," 1913 (350 copies), received from the Stationery Office.

The following occasional publications are in the press :—

Geophysical Memoirs, Vol. I, Title-page, Index, &c.
Geophysical Memoirs, No. 11 (being the first number of the second volume).
Monthly Meteorological Charts of Baffin Bay and Davis Strait.
Marine Observer's Handbook.
Observer's Handbook, 1914 edition.
Diagram of Rainfall for the London District.
Normals of Temperature, Rainfall, and Sunshine, with Maps.

The following publications are in active preparation :—

Calendar, 1915.
Circular 001, 1915 edition.

A bound copy of the Year Book for 1912, dated 22nd August 1914, is laid on the table.

60 bound copies of the Seaman's Handbook, stamped with the Office device and the names of 60 Fishery Barometer Stations, are ready for despatch to the stations.

At the outbreak of war the issue of publications was partially suspended, and no publications have been sent to Germany, Austria, Belgium, Serbia. The issue to some addresses in France, Russia, and other countries was temporarily suspended, but was gradually resumed as postal facilities allowed.

—	June.		July.		August.		September.	
	Received.	Issued.	Received.	Issued.	Received.	Issued.	Received.	Issued.
Daily Weather Report	890	890	890	840	890	838*	880	844*
Weekly Weather Report	375	343	375	347	375	316*	375	322*
Monthly Weather Report	600	509	600	512	600	486*	600	486*
Do. do. (Maps)	25	2	25	2	25	2	25	2
Daily Readings	75 (April)	55 (April)	75 (May)	55 (May)	—	—	75 (June)	46 (June)*
Geophysical Journal, 1913	150 (May)	139 (May)	150 (June)	141 (June)	150 (July)	90 (July)*	150 (Aug.)	90 (Aug.)*
Do. do. Supplement, 1912 ...	—	—	150	141	—	—	—	—
Do. do. Title Page, 1912 ...	—	—	—	—	—	—	150	117
Do. do. Annual Vol., 1912 ...	—	—	—	—	225	—	—	65
Hourly Values—Meteorological, 1913—Kew	300 (May)	12 (April)	—	12 (May)	300 (June)	12 (June)	300 (July)	12 (July)
Eskdale	300 (April)	12 „	300 (May)	12 „	300 „	12 „	300 „	12 „
Valencia	300 (May)	12 „	300 (June)	12 „	300 (July)	12 „	300 (Aug.)	12 „
Do. —Geophysical, 1912	—	—	400	325	—	—	—	—
Monthly Meteorological Charts (Atlantic) ...	600 monthly to July (2).	520	600 monthly to Aug. (3).	569	600 monthly to Sept. (3).	486*	600 monthly to Oct. (2).	538*
(Indian) ...	350 (July)	313	350(Aug.&Sept.)	260	—	181*	350 (Oct.)	284*
International Upper Air Observations, 1912	50 (May & June)	31 (May & June)	—	—	—	—	—	—
Ninth Annual Report	—	—	—	—	450	329	—	5
Observer's Handbook (1913)	—	23	—	19	—	7	—	—
"Forecasting Weather"	—	1	—	—	—	—	—	—
Cloud Atlas	—	1	—	—	—	2	—	—
Report—Commission for Weather Telegraphy	—	2	—	1	—	—	—	—
Do. do. Maritime Meteorology	—	1	—	1	—	—	—	—
Codes of Signals, 1913	25	27	—	4	—	2	—	2
Calendar, 1914	—	2	—	—	—	—	—	—
Structure of the Atmosphere	—	—	—	—	—	—	—	—
Seaman's Handbook	—	25	—	34	—	13	—	16
Report of Rome Meeting of I.M.C., 1913 ...	475	218	—	2	—	2	—	3
Fourth Report on Wind Structure	200	99	—	1	—	—	—	—
Instructions in Met. Telegraphy, 1914 ...	100	—	—	43	—	28	—	3
Report on Work of S.S. "Scotia"	—	—	—	—	—	—	350	3
Geophysical Memoirs, No. 1	—	1	—	—	—	1	—	—
No. 2	—	1	—	—	—	—	—	—
No. 3	—	1	—	1	—	—	—	—
No. 4	—	1	—	—	—	—	—	—
No. 5	—	1	—	—	—	1	—	1
No. 6	—	3	—	—	—	1	—	—
No. 7	—	2	—	1	—	1	—	—
No. 8	600	—	—	—	—	3	—	—
No. 9	—	—	—	—	—	—	600	20
No. 10	—	—	—	—	600	5	—	20

* Issue restricted on account of War conditions.

Receipts from sales at M.O.—£3 13*s.* 11*d.* (June), £38 0*s.* 4*d.* (July), £6 3*s.* 7*d.* (August), 6*s.* 4*d.* (September).

M.O. Press.—June to September, 1914.—The printing of the undermentioned publications has been as contract :—

Daily Weather Report.
Maps for the Weekly Weather Report, until war broke out, when they were discontinued.
" " Monthly Weather Report.
Monthly Meteorological Charts of the North Atlantic Ocean.
" " " " Indian Ocean.

	June.	July.	August.	September.
Requisitions on hand at the beginning of the month	9	7	5	4
Requisitions issued during month	4	8	3	2
	13	15	8	6
Requisitions discharged during month... ...	6	10	4	4
Requisitions on hand at the end of the month	7	5	4	2
Additional copies of the Daily Weather Report printed for educational purposes	70	250	—	—

1. *Marine Division* (June).—Logs and Registers.—Dealt with on receipt, 20 Meteorological Logs, and 1 abbreviated Log ; also 116 North Atlantic Registers ; 93 Radio-telegraphy Registers, and 10 Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic.—The issue for July, 1914, published ; the issue for August, 1914, in course of preparation. Collating and charting Monthly Salinity and Sea Surface Temperature observations for the North Atlantic.

Monthly Meteorological Charts of the Indian Ocean.—Issue for August, 1914, in course of publication.

Monthly Meteorological Charts of Baffin Bay and Davis Strait.—Charting monthly results of ice to show distribution. Plotting and meaning Danish Annual Sea Temperatures for the 17 years, 1895–1911. Fixing wind roses in position on final charts.

Extraction of observations relative to China Sea.—Data extracted and tabulated from 20 logs.

Corrections for barometers obtained in connexion with

(1) Reports by Radio-telegraphy, 23.
(2) North Atlantic Registers, 2.
(3) Indian Ocean Registers, 1.

Observational duties.—Time occupied 25 hours.

Extraction of observations recorded in selected areas for the Dutch Meteorological Institute.—Seventh contribution finished and despatched. Time occupied, 88 hours.

Indexing in ocean 10° Squares.

Notices of Ice sent to "Shipping Gazette."—On 18 days.

(July.)—Logs and Registers.—Dealt with on receipt, 23 Meteorological Logs ; also 128 North Atlantic Registers, 91 Radio-telegraphy Registers, and 12 Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic.—The issue for August, 1914, published ; the issue for September, 1914, in course of preparation.

Monthly Meteorological Charts of the Indian Ocean.—Issue for September, 1914, published ; issue for October, 1914, in course of preparation.

Monthly Meteorological Charts of Baffin Bay and Davis Strait.—Drawing isobars and isotherms, charting monthly results of ice to show distribution and frequency. Correcting proof copies.

Extracting recent observations relating to all oceans ready for charting ; commencing with July, 1914.

Extraction of observations relative to China Sea.—Data extracted and tabulated from 10 logs.

Tabulating wind observations in the North Atlantic for the Board of Trade.

Corrections for barometers obtained in connexion with

(1) Reports by Radio-telegraphy, 34.
(2) North Atlantic Registers, 3.
(3) Indian Ocean Registers, 1.

Observational duties.—Time occupied, 26 hours.

Extraction of observations recorded in selected areas for the Dutch Meteorological Institute.—Time occupied, 75 hours.

Indexing data in ocean 10° squares.

Notices of Ice sent to "Shipping Gazette."—On 20 days.

Notices of Ice sent to "Lloyd's List."—On 3 days.

(August.)—Logs and Registers.—Dealt with on receipt, 16 Meteorological Logs, and 4 Lighthouse Registers ; also 87 North Atlantic Registers, 50 Radio-telegraphy Registers, and 9 Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic.—The issue for September, 1914, published ; the issue for October, 1914, in course of preparation.

Monthly Meteorological Charts of the Indian Ocean.—Issue for October, 1914, in course of publication. New Ice Chart for October-November-December drawn.

Monthly Meteorological Charts of Baffin Bay and Davis Strait.—Completed six months' final charts of Pressure, Air and Sea Temperature ; also final outline chart of Baffin Bay ; for Lithographer. Examined and corrected proofs of Wind and Air Temperature for July and September.

Extraction of observations relative to China Sea.—Data extracted and tabulated from 8 logs.

Corrections for barometers obtained in connexion with
(1) Reports by Radio-telegraphy, 13.
(2) North Atlantic Registers, 4.

Observational duties.—Time occupied, 30 hours.

Extraction and tabulation of recent 7 a.m. and 6 p.m. G.M.T. observations, all oceans.—Exhausted the 7 a.m. observations in 6 logs, and the 6 p.m. observations in 9 logs.

Plotting of recent 7 a m. and 6 p.m. observations on blank charts.—This work was commenced by Mr. Albert Jordan, Science Graduate and Geography Master at Luton School, who volunteered his services to the Office during his vacation in a telegram to the Director (see M.O. 3566 et seq.). Mr. Jordan commenced plotting marine observations at the Office on the 11th, and subsequently continued the work at Luton. He charted all the tabulated data mentioned above before the close of the month.

Indexing in ocean 10° squares.

Notices of Ice sent to "Lloyd's List" and "Shipping Gazette."—On 17 days.

Nothing was done for Utrecht in August because Mr. Williams was engaged upon work for the Load Line Committee ; also in extracting and tabulating G.M.T. observations.

(September.)—Logs and Registers.—Dealt with on receipt, 30 Meteorological Logs, and 3 Lighthouse Registers ; also 71 North Atlantic Registers, 14 Radio-telegraphy Registers, and 5 Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic.—The issue for October, 1914, published ; the issue for November, 1914, in course of preparation.

Monthly Meteorological Charts of the Indian Ocean.—Issue for October, 1914, published ; the issue for November, 1914, in course of publication.

Monthly Meteorological Charts of Baffin Bay and Davis Strait.—Examined and corrected proofs of Wind and Air Temperature for May, June, August, and October, and revises of July and October. Prepared whole 6 months for final revise of black stone for Wind and Temperature Charts.

Corrections for barometers obtained in connexion with
(1) Reports by Radio-telegraphy, 8.
(2) North Atlantic Registers, 4.
(3) Indian Ocean Registers, 1.

Observational duties.—Time occupied, 20 hours.
Extracting and tabulating 6 p.m. G.M.T. observations.—Time occupied, 24 hours.
Marine Observer's Handbook.—Preparing illustrations.
Indexing in ocean 10° squares.
Notices of Ice sent to "Lloyd's List" and "Shipping Gazette."—On 18 days.

Obtaining data for Load Line Committee relative to gales in the North Atlantic.—Completed 1 year, and subsequently retabulated the same on new lines. Extracted data for about two additional years.

2. *Forecast Division* (Central Office, June).—(1). Current work on Daily, Weekly and Monthly Weather Reports and on Atlantic Charts, up to date.

(2). Number of Wireless Reports received from
(1). H.M. Ships 0
(2). Mercantile Marine 534

Number of Wireless Reports received in time for inclusion in Daily Weather Report on 7 a.m. map		54	
Do. do. on 7 a.m. or 6 p.m. map of "yesterday"		284	
Do. do. received 48 hours or more after observations were taken...		63	
Do. do. plotted on Morning map before 9 a.m.	41		
Do. do. plotted on Afternoon map before 2 p.m.	2	60	
Do. do. plotted on Evening map before 7 p.m.	17		
Number of Reports containing information which proved of practical assistance to the Forecaster		28	

(3). Corrections to Daily Weather Report for May prepared.

(4). Wind Frequency results extracted and checked to end of December.

(5). Working Charts prepared for binding to end of February.

(6). Checking of 8.30 p.m. forecasts completed up to 17th January, 1914.

(7). Storm Warning checking completed :—
Anemometer Results to end of May.
English Lighthouses to end of May.
English Lightships to middle of June.
Scottish Lighthouses to end of April.
Irish Lighthouses to end of May.

(8). Inquiries :—

Prepaid replies	25
Other telegraphic inquiries	26
Telephone inquiries	16
Personal	3

(9). Serial Forecasts.—Sent to 23 persons or authorities, including

(*a*). On behalf of the *Admiralty* to six Aviation Stations daily.
(*b*). On behalf of the *War Office* to five Aviation Stations daily for the information of the Officers of the Royal Flying Corps.
(*c*). On behalf of *Board of Agriculture* to Agricultural Shows in various parts of the country.

(10). Admiralty Forecasts :—

(*a*). Three Dockyards (daily).
(*b*). For transmission by Admiralty to H.M. Ships within range of Wireless Telegraphy (twice daily).
(*c*). Aircraft Report for transmission by Wireless Telegraphy to Aviation Stations (twice daily).
(*d*). For transmission by Admiralty by Wireless Telegraphy to Gibraltar, giving forecast of wind in Bay of Biscay and on Iberian coast (twice daily).

(11). Harvest Forecasts.—(*See* separate report).

(12). A considerable time has been spent in the preparation of a new outline working map with an enlarged area permitting of the inclusion of Spitzbergen, and also, on the back, a map of the North Atlantic westward of the 30° meridian.

(Branch Office at Farnborough, June.)—The normal telegraphic observations have been continued throughout the month.

The preparation of the evening map and forecast has been continued regularly except on Monday, June 22nd, the King's birthday.

13 single theodolite pilot balloon ascents have been made during the month.

The ordinary analysis work has been kept up to date.

Mr. Dines has been absent from June 9th to 27th on inspection duty. During this time Mr. Billett has conducted the work of the Office.

The tests on the accuracy of the barograph have been continued by Mr. Billett, who has also finished the translation of Fischli's "Aeronautische Meteorologie," chapter iv.

No further useful experiments were possible with the tetranemograph on account of insufficiency of wind.

During the month a bookcase has been added to the equipment of the Office.

(Falmouth Observatory, June).—Routine work :—

Monthly Return (Form 355), two copies. Completed and checked for May. June in hand.
Tabulation of :—
Barograms (Form 402). February and March re-written on Form 430. Corrections applied, means taken &c., and checked.

Hourly Values of Rainfall (Form 410)	Completed and checked for May. June in hand.
Hourly Values of Sunshine (Form 403)	
Falmouth Robinson Anemograms (Form 401) ...	
Scilly Robinson Anemograms (Form 401)	
Falmouth Record of Wind Direction (Form 224) ...	Completed and checked for May.
Scilly Record of Wind Direction (Form 224) ...	

Plymouth P.T. Anemograms (Form 430). Completed and checked for May. June in hand.

Analysis of

Pendennis Pressure Tube Anemograms (Form 339)...	Up to date.
Scilly Pressure Tube Anemograms (Form 339) ...	
Plymouth do. do.	

Pilot Balloon Ascents, &c.—Five Pilot Balloon Ascents. Report on working of Dines Float Barograph. Daily, Weekly and Monthly Reports to Press and to various Authorities—County Council, &c.

(Central Office, July).—(1). Current Work on Daily, Weekly and Monthly Weather Reports and on Atlantic Charts, up to date.

(2). Number of Wireless Reports received from

(1). H.M. Ships 0
(2). Mercantile Marine 504

Number of Wireless Reports received in time for inclusion in Daily Weather Report on 7 a.m. map	48
Do. do. on 7 a.m. or 6 p.m. map of "yesterday"	283
Do. do. received 48 hours or more after observations were taken...	39
Do. do. plotted on Morning map before 9 a.m.	33
Do. do. plotted on Afternoon map before 2 p.m.	0
Do. do. plotted on Evening map before 7 p.m.	13
Number of Reports containing information which proved of practical assistance to the Forecaster	22

In addition 14 messages, delayed more than 48 hours in transit, were received by post under the arrangement recently made with the Marconi Company.

(3). Corrections to Daily Weather Report for June prepared, and in Printer's hands.

(4). Wind Frequency results extracted to end of January, 1914.

(5). Working Charts prepared for binding up to 10th April.

(6). Checking of 8.30 p.m. forecasts completed up to 23rd January.

(7). Storm Warning checking completed :—

Anemometer Results to end of May.
English Lighthouses to end of June.
English Lightships to middle of June.
Scottish Lighthouses to end of May.
Irish Lighthouses to end of June.

(8). Inquiries :—

Prepaid Replies	32
Other Telegraphic Inquiries	16
Telephone Inquiries	19
Personal	1

(9). Serial Forecasts :—

(*a*). On behalf of the *Admiralty* to several Aviation Stations daily.

(*b*). On behalf of the *War Office* to several Aviation Stations daily for the information of the Officers of the Royal Flying Corps.

(*c*). On behalf of *Board of Agriculture* to Agricultural Shows in various parts of the country.

(10). Admiralty Forecasts :—

(*a*). 3 Dockyards (daily).

(*b*). For transmission by Admiralty to H.M. Ships within range of Wireless Telegraphy (twice daily).

(*c*). Aircraft Report for transmission by Wireless Telegraphy to Aviation Stations (twice daily).

(*d*). For transmission by Admiralty by Wireless Telegraphy to Gibraltar, giving forecast of wind in Bay of Biscay and on Iberian Coast (twice daily).

Between July 19th and 21st forecast telegrams were sent twice daily to the Commodore of the Royal Yacht *Victoria and Albert* for the information of H.M. the King during his visit to Portsmouth.

(11). Harvest Forecasts.—(*See* separate report).

(12). Proofs of the New Working Chart were received, examined, and returned for Press.

(Branch Office at Farnborough, July).—The regular telegraphic and forecasting work has been continued as usual.

15 single theodolite pilot balloon ascents have been made.

During the month the showcase for exhibiting forecasts and charts has been erected and brought into use.

Observations have also been commenced with the black bulb *in vacuo*.

At the commencement of the month a large scale error was found in the hair hygrograph. This was corrected, and a recent calibration proved that the scale was thereafter approximately correct.

A slight error in the centring of the ball of the sunshine recorder has also been corrected.

Mr. Dines has prepared an opening paper for the discussion on "Meteorology and Aeronautics" arranged for the meteorological conference to be held in Edinburgh in September.

The regular analysis work has been kept up to date.

Mr. Billett has been away for three weeks, and Mr. Allnutt for one week, on holiday, during the month.

(Falmouth Observatory, July).—Routine Work.—Monthly Return (Form 355), (two copies), completed and checked for June, July in hand.

Tabulation of :—

Barograms (Form 402)	Completed and checked for June ; July in hand.
Hourly Values of Rainfall (Form 430)	
Hourly Values of Sunshine (Form 403)	
Falmouth Robinson Anemograms (Form 401)	
Scilly Robinson Anemograms (Form 401)	
Falmouth Record of Wind Direction (Form 224)	Completed and checked for June.
Scilly Record of Wind Direction (Form 224)	

Plymouth P.T. Anemograms (Form 430). Completed and checked for June ; July in hand.

Analysis of :—

Pendennis Pressure Tube Anemograms (Form 339) ...	Up to date.
Scilly Pressure Tube Anemograms (Form 339)	
Plymouth Pressure Tube Anemograms (Form 339) ...	

No pilot balloon ascents. Checking of six weeks of Upavon forecasts. Daily, weekly, and monthly reports to press, County Council, and British Rainfall Organization.

Mr. Phillips on holiday for the three weeks ended 20th July.

(Central Office, August).—(1). Current work on daily and monthly weather reports and on Atlantic charts, up to date. Owing to the paucity of information from abroad the charts which ordinarily accompany the weekly weather report have not been prepared since 1st August.

Very few M.S. reports of observations at 7 a.m. and 6 p.m. have been received, but a considerable number of schedules giving observations at 8 a.m. and 8 p.m. have been received, and the data have been plotted. For the early part of the month the data for the Atlantic are fairly complete, but all Iceland reports are still missing.

(2) Number of wireless reports* received from

(1) H.M. ships	0
(2) Mercantile marine	98
Number of wireless reports received in time for inclusion in daily weather report on 7 a.m. map	3
Do. do. on 7 a.m. or 6 p.m. map of "yesterday" ...	61
Do. do. 48 hours or more after observations were taken	27
Do. plotted on morning map before 9 a.m.	3
Do. plotted on afternoon map before 2 p.m.	0
Do. plotted on evening map before 7 p.m.	4
Number of reports containing information which proved of practical assistance to the forecaster	6
Reports received by post (delayed over 48 hours)	18

(3) Corrections to daily weather report for July issued.

(4) Wind frequency results extracted to middle of April.

(5) Working charts prepared for binding to end of May.

(6) Checking of 8.30 p.m. forecasts completed up to February 28, also for period June 1–6.

(7) Storm warning checking completed :—
Anemometer results to end of July.
English lighthouses to end of July.
English lightships to middle of August.
Scottish lighthouses to end of June.
Irish lighthouses to end of June.

(8) Inquiries :—

Prepaid replies	11
Other telegraphic inquiries	6
Telephone inquiries	6
Personal	0

(9) Serial forecasts :
(*a*) On behalf of the *Admiralty* to 11 aviation stations daily.
(*b*) On behalf of the *War Office* to three aviation stations daily for the information of the officers of the Royal Flying Corps; discontinued on 1st September. The forecast is now being sent only to Dover and to headquarters at S. Farnborough.

(10) Admiralty forecasts :—
(*a*) Three dockyards (daily).
(*b*) For transmission by Admiralty to H.M. ships within range of wireless telegraphy (twice daily). On eleven occasions in the morning and thirteen occasions in the evening the Admiralty declined to receive these messages.
(*c*) Aircraft report for transmission by wireless telegraphy to aviation stations (twice daily).
(*d*) For transmission by Admiralty by wireless telegraphy to Gibraltar, giving forecast of wind in Bay of Biscay and on Iberian coast (twice daily). On seven occasions in the morning and thirteen occasions in the evening the Admiralty declined to receive these messages.
(*b*) and (*d*) were discontinued on 1st September.

(11) Harvest forecasts.—*See* separate report.

(Branch Office at Farnborough, August).—The regular telegraphic and forecasting work has been carried on as usual.

Sixteen single theodolite pilot balloon ascents have been made.

During the month a hut has been erected in the thermometer enclosure to facilitate the changing of charts, &c. in the rain and after dark.

The black bulb thermometer was broken on the 24th by someone throwing stones. A wire cage has been made to protect the bulb in future.

Some further experiments have been carried out on the errors in the sunshine recorder.

Upper air temperature distributions have been calculated from several pilot balloon ascents.

The regular analysis work has been kept up to date.

The tetranemograph poles and tubes have been repaired and put in order.

Mr. Dines paid a short visit to Dover from the 15th to the 17th in connection with the supply of special meteorological information to the Royal Naval Air Service.

(Falmouth Observatory, August).—Routine work.—Monthly return, two copies (Form 355). Completed for July. August in hand.

Tabulation of :—

Barograms (Form 402)	Completed and checked for July. August in hand.
Hourly Values of Rainfall (Form 430)	
Hourly Values of Sunshine (Form 403)	
Falmouth Robinson Anemograms (Form 401)	
Scilly Robinson Anemograms (Form 401)	
Falmouth Record of Wind Direction (Form 224)	Completed and checked for July.
Scilly Record of Wind Direction (Form 224)	

Plymouth P.T. Anemograms (Form 430). Completed and checked for July. August in hand.

* In consequence of the war scarcely any wireless reports were received after 10th August.

Analysis of :—
Pendennis Pressure Tube Anemograms (Form 339) ...
Scilly Pressure Tube Anemograms (Form 339) ... ... } Up to date.
Plymouth Pressure Tube Anemograms (Form 339) ...

Two pilot balloon ascents. Checking of one month's South Farnborough forecasts. Daily, weekly, and monthly reports to press and to County Council and British Rainfall Organization.

(Central Office, September).—(1) Current work on daily and monthly weather reports and on Atlantic charts, up to date.

(2) Number of wireless reports received from

(1) H.M. ships	0
(2) Mercantile marine	44
Number of wireless reports received in time for early inclusion on 7 a.m. map ...	3
Do. do. on 7 a.m. or 6 p.m. map of "yesterday" ...	24
Do. do. 48 hours or more after observations were taken	4
Do. plotted on morning map before 9 a.m.	3
Do. plotted on afternoon map before 2 p.m.	0
Do. plotted on evening map before 7 p.m.	2
Number of reports containing information which proved of practical assistance to the forecaster	3

(3) Corrections to daily weather report for August prepared.

(4) Wind frequency results extracted to middle of June.

(5) Working charts prepared for binding to end of June.

(6) Checking of 8.30 p.m. forecasts completed up to March 22 ; June 1–21 also checked.

(7) Storm warning checking completed :—
Anemometer results, end of July.
English lighthouses, end of August.
English lightships, middle of September.
Scottish lighthouses, end of July.
Irish lighthouses, end of August.
Results of checking summarised to end of May.

(8) Inquires :

Prepaid replies	5
Other telegraphic inquiries	1
Telephone inquiries	7
Personal	0

(9) Serial forecasts :—
(*a*) On behalf of the *Admiralty* to eight* aviation stations daily.
(*b*) On behalf of the *War Office* to five* aviation stations daily for the information of the officers of the Royal Flying Corps.

(10) Admiralty forecasts :—
(*a*) Three dockyards (daily).
(*b*) Aircraft report for transmission by wireless telegraphy to aviation stations (twice daily).

The messages hitherto sent to the Admiralty for transmission by wireless telegraphy to H.M. ships in home waters and to Gibraltar ceased after the end of August.

(11) Special 3 a.m. forecasts :—

From 11th to 15th September, and again from 23rd September onwards, reports containing observations made at 3 a.m. were received from a number of telegraphic reporting stations, and special forecasts, based upon these reports, were prepared and sent by wire at about 4 a.m. to certain aviation stations. On the earlier dates mentioned this service was conducted at the Meteorological Office ; on the later dates at the Branch Office, South Farnborough, but on 29th September the service was again transferred to London.

(12) On 28th September the issue of reports to the Press and to the public was restricted in accordance with the appended circular letter, by instruction from the Director. The issue of the Daily Weather Report to the public was held over until the despatch of the evening mail.

Meteorological Office,
South Kensington, London, S.W.,
28th September, 1914.

SIR,

THE Director wishes me to inform you that until further notice the following issues of information are suspended :—

Morning.—Transcript of Observations. ... } In anticipation of the issue of the Daily Weather Report.
Remarks on the weather. ...
Forecasts. ... ...

Evening.—Remarks on the weather.
Observations, with the exception of those of duration of bright sunshine, rainfall, and maximum and minimum temperatures at Health Resorts.
The "general inference."

I am, &c.,
R. G. K. LEMPFERT,
Superintendent, Forecast Division.

* The number of these reports fluctuates from time to time. The figures represent those in operation at the close of September.

(Branch Office at Farnborough, September).—The regular telegraphic and forecasting work has been carried on as usual. A copy of the evening map and forecast has been prepared for Arnold House each night. Copies of the morning forecast received from London and of the evening one prepared here have also been delivered at the Headquarters, Royal Flying Corps, each day.

A special early morning forecast has also been prepared at the request of the Admiralty for two periods amounting together to about a fortnight. (This work has been done partly at this office and partly at the Meteorological Office, London.)

16 single theodolite pilot balloon ascents have been made.

A new black bulb thermometer has been obtained. Solar maximum observations were recommenced on the 1st of the month.

A considerable number of upper air temperature distributions have been calculated from the data obtained in past pilot balloon ascents.

The regular analysis work has been kept up to date.

One record has been obtained from the tetranemograph.

Some dark blinds have been obtained to cover the workshop windows to render it suitable for developing curves from the tetranemograph and for other photographic work.

Mr. Dines has had a week's holiday during the month and Mr. Allnutt has attended at Benson Observatory for about a fortnight in order to take the early morning readings required from that station for the special forecasts mentioned above.

(Falmouth Observatory, September).—(Routine Work).—Monthly Return (Form 355), (two copies), completed and checked for August. September in hand.

Tabulation of :—

Barograms (Form 402)	Completed and checked for August. September in hand.
Hourly Values of Rainfall (Form 430)	
Hourly Values of Sunshine (Form 403)	
Falmouth Robinson Anemograms (Form 401)	
Scilly Robinson Anemograms (Form 401)	
Falmouth Record of Wind Direction (Form 224)... ...	Completed and checked for August.
Scilly Record of Wind Direction (Form 224)	
Plymouth Pressure Tube Anemograms (Form 430).	Completed and checked for August. September in hand.

Analysis of :—

Pendennis Pressure Tube Anemograms (Form 339) ...	Up to date.
Scilly Pressure Tube Anemograms (Form 339)	
Plymouth Pressure Tube Anemograms (Form 339) ...	

Four pilot balloon ascents. Checking of two month's South Farnborough Forecasts. Daily, weekly, and monthly reports to press, County Council, and British Rainfall Organization.

Mr. Brenton has been absent all the month on military duty, and Mr. Phillips from the 6th to 16th inclusive.

3. *Statistical Division* (June).—British Meteorological and Magnetic Year Book.—1. Weekly Weather Report.—Current issues (Nos. 22, 23, 24, 25). Proof of Wind Summary, Appendix III. corrected and returned for revise.

2. Monthly Weather Report.—May issued.

3. (i.) Daily Readings.—April, 1914, issued.

(ii.) Geophysical Journal.—May, 1913, issued.

4. Hourly Readings :—

Valencia.—May, 1913, issued, June copy sent to printer, July in hand.

Kew.—May, 1913, issued, June copy sent to printer, July in hand.

Eskdalemuir.—April and May, 1913, issued, June copy sent to printer, July in hand.

Aberdeen.—Hourly means for February and March prepared, April means in hand.

Anemograms.—Pressure-tube anemograms from 15 stations analysed, and from 4 stations tabulated, up to 27th June. In addition to these 4 stations are analysed at South Farnborough, 3 at Falmouth and the Eskdalemuir records are analysed and tabulated at the Observatory. Robinson cup anemograms from 5 stations tabulated up to the 29th June. Besides these the records from 2 stations are tabulated at Falmouth.

Sunshine Cards.—The cards from 76 stations were examined and returned. A selection of 5 cards from each station was re-measured, and returned with a comparison of the duration estimated by the observer and in this office. Cards for Balruddery and Bath measured for use in the Monthly Weather Report. Cards from 123 stations filed in the office (none measured this month).

Aneroidograms.—Form 531 from 30 stations, Form 533 from 15 stations, filed up to date.

Thermograms.—Form 542 from 1 station, Forms 547 and 548 from 6 stations, and Form 549 from 1 station filed up to date.

Miscellaneous.—Rain curves and hyetograms from 7 stations, microbarograms from 2 stations, radiograms from 1 station, and hygrograms from 3 stations, filed up to date. Rainfall returns from 92 stations entered on Form 372. Fleetwood wind tabulations for June copied and sent to Messrs. Spencer & Co., Fleetwood. Holyhead wind tabulations for June copied and sent to the Dublin Steam Packet Company. Noon values of wind velocity and direction for Valencia, Quilty, and Roche's Point copied for June and sent to Mr. F. H. Keane.

(July and August.)—British Meteorological and Magnetic Year Book.—1. Weekly Weather Report.—Current issues (Nos. 26 to 33) except the charts which should have accompanied Nos. 31, 32, and 33. These will be issued as soon as the necessary data have been received. They are missing on account of the war. Preparation for printer of the Preface and Introduction to Parts I. and II. of the British Meteorological and Magnetic Year Book, 1913.

2. Monthly Weather Report.—June and July issued.

3. (i.) Daily Readings.—May issued.

(ii.) Geophysical Journal.—June and July, 1913, issued. Tables for second quarter of 1914. Reports of Registrars-General for England and Ireland prepared and forwarded.

4. Hourly Readings :—

Valencia.—June, July, 1913, issued, copy for August in hand.
Kew.—June, 1913, issued, July proof read, copy for August in hand.
Eskdalemuir.—June, 1913, issued, July proof read, copy for August in hand.
Aberdeen.—No progress since last report.

Anemograms.—Pressure-tube anemograms from 15 stations analysed, and from 4 stations tabulated up to 29th August. In addition to these 4 stations were analysed at South Farnborough and 3 at Falmouth. The Eskdalemuir records were analysed and tabulated at the Observatory. Robinson cup anemograms from 5 stations were tabulated up to 31st August. In addition to these the records from 2 stations were tabulated at Falmouth.

Sunshine Cards.—The cards from 75 stations were examined and returned in July, and from 78 stations in August. The cards from Balruddery and Bath were measured each month for use in the Monthly Weather Report. The cards from 124 stations were examined and filed in the office each month.

Aneroidograms.—Form 531 from 30 stations, Form 533 from 15 stations, filed up to date.

Thermograms.—Form 542 from 1 station, Forms 547 and 548 from 6 stations, and Form 549 from 1 station, filed up to date.

Miscellaneous.—Rain curves and hyetograms from 7 stations, microbarograms from 2 stations, radiograms from 1 station, and hygrograms from 3 stations, filed up to date. The Holyhead and Fleetwood anemograph tabulations were copied for the usual recipients each month.

(September.)—British Meteorological and Magnetic Year Book.—1. Weekly Weather Report.—Current issues (Nos. 34 to 38) except the charts, which will be issued as soon as the necessary data have been received.

2. Monthly Weather Report.—August, 1914, issued.

3. (i.) Daily Readings.—June, 1914, issued.

(ii.) Geophysical Journal.—August, 1913, issued.

(iii.) Annual Report Registrar-General, England, 1913 ; meteorological tables, &c., prepared.

4. Hourly Readings, 1913.

Valencia :—August issued, copy for August and September sent to printer.
Kew :—July issued, copy for August and September sent to printer.
Eskdalemuir :—July issued, copy for August sent to printer.
Aberdeen :—Hourly means for April to June prepared, means for July in hand.

Anemograms.—Pressure-tube anemograms from 15 stations analysed, and from 4 stations tabulated, up to 26th September. In addition to these 4 stations were analysed at South Farnborough, and 3 at Falmouth. The Eskdalemuir records were analysed and tabulated at the Observatory. Robinson cup anemograms from 5 stations were tabulated up to 28th September. In addition to these the records from 2 stations were tabulated at Falmouth.

Sunshine Cards.—The cards from 78 stations for September were examined and returned with a comparison of the estimate of duration made by the observer with that made in the office. The cards from 124 stations were examined, and filed in the office.

Aneroidograms :—Form 531 from 30 stations, and Form 533 from 15 stations filed up to date.

Thermograms :—Form 542 from 1 station, Forms 547 and 548 from 6 stations, and Form 549 from 1 station, filed up to date.

Miscellaneous :—Rain curves and hyetograms from 7 stations, microbarograms from 2 stations, radiograms from 1 station, and hygrograms from 3 stations, filed up to date. Rainfall returns from 266 stations entered on Summary Sheet (Form 372). The Fleetwood and Holyhead anemograph tabulations were copied and sent to the usual recipients.

4. *Instruments Division* (June, July, August and September).—The deficiencies at the dockyards shown in the returns dated June 30th have been filled. A set of meteorological instruments for use at the Kingsnorth Air Station has also been issued on Royal Navy account. Instruments for use on H.M.S. "Audacious" have been lent by the Office.

The agents' stocks at Liverpool, Shields, Cardiff and Hull have been replenished and 21 ships, including the "Endurance" and "Aurora" of the Imperial Trans-Antarctic Expedition, have received instruments direct from the Office.

Seven thermometers have been sent to Sea Temperature stations. Barometers graduated in millibars were issued to the telegraphic stations at Blacksod, Roches, Birr, Spurn Head and Scilly. A large barograph has been lent to Dover. A sunshine recorder has been set up at Malin Head, a new screen at St. Ann's Head.

The instruments issued to Kew Observatory were cloud goggles, Grass Min. Ther. (Abs.), Max. Ther. (F.) and the apparatus for measuring the level of the water in the well. A new ionium collector for the electrograph was sent to Eskdale, as well as four wooden troughs lined with lead designed for filling with calcium chloride. A station barometer was sent to Valencia.

Instruments have been supplied on repayment in about 36 cases. Amongst these may be noted the outfit of The Imperial Trans-Antarctic Expedition for which special low temperature spirit thermometers graduated on the absolute scale were made.

Fifteen consignments on Colonial requisitions have been despatched. A new barometer has been lent to the Falkland Islands. A portable Fortin has been lent to the National Physical Laboratory for use in the comparison of the working standard at the National Physical Laboratory with the ultimate Kew standard.

Raingauge glasses.—Small glasses graduated in tenths up to 1 mm. have been purchased: specimens have been issued to the observatories.

Numerous mistakes having been made in coding rainfall at telegraphic stations, additional figures showing the code are being engraved on the glasses graduated to 10 mm. in use at these stations.

Staff.—Mr. Levin succeeded Mr. Brame as from July 1st. Mr. Gendle represented the Office at the Royal Agricultural Show (*see* separate report below); since the end of July he has been absent on military duties. Mr. Levin enlisted in September, his place being taken temporarily by Miss Wigley

Observatories—Kew (June).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	5
	Inclination	5
	Horizontal force	5
Potential gradient		on 24 days.
Wilson apparatus		„ 18 „
Ebert „		„ 18 „
Pyrheliometer		„ 9 „

International cloud observations were made on four days.

The water-dropping electograph has been cleaned and its scale value re-determined.

Lieut. Danglish, H.I.M.S., completed his course of magnetic instruction.

The vertical force magnet for Toronto, when tried with its new temperature bar and weights, was found to be adequately compensated. The examination has accordingly been concluded and a certificate issued. Mr. Francis has returned from his holiday. During his absence the observations of horizontal force and declination intended to determine base line values, were made by the Superintendent. Some observations intended for a re-determination of the moment of inertia of the Kew collimator magnet were made by Mr. Stewart. A large case for holding keys has been fitted.

On Tuesday, June 9th, there were simultaneous sudden discontinuities in the traces of all three magnetic elements, for which no explanation has been forthcoming other than a flash of lightning, which was at least exceedingly near the building. As the traces showed no immediate return to the undisturbed position, some iron in the immediate neighbourhood must have been moved or have sustained a sub-permanent change of magnetic moment.

(July).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	4
	Horizontal force	4
	Vertical force	4
Potential gradient		on 20 days.
Wilson apparatus		„ 9 „
Ebert „		„ 9 „
Pyrheliometer		„ 10 „

International cloud observations were made on three days.

The Director and Captain Lyons having visited the observatory and decided that old accounts, cheque books and numerous miscellaneous documents which had accumulated need no longer be preserved, the Superintendent went through a large mass of old papers, and had those sorted out and destroyed which appeared to him to satisfy the criteria for destruction approved by the Director.

In view of a reception held on July 14th by the Director, the Superintendent, Mrs. Shaw and Miss Chree, the three rooms of the old "Clinical House" had their contents moved out, and a cleaning, which was badly wanted, was administered.

Ten solar maximum (black-bulb in vacuo) thermometers sent by the National Physical Laboratory have been compared with the standard, one being rejected.

Photographic paper has been supplied to Aberdeen and Eskdalemuir Observatories.

Two observers belonging to Sir Ernest Shackleton's Expedition (Messrs. James and Hussey) are having instruction given them in taking magnetic and other observations.

Mr. C. D. Stewart has commenced his holiday and Mr. E. Boxall has returned.

(August).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorogical data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	4
	Horizontal force	4
	Inclination	4
Potential gradient		on 19 days.
Wilson apparatus		„ 15 „
Ebert „		„ 15 „
Pyrheliometer		„ 8 „

International cloud observations were made on three days.

In connection with the solar eclipse on August 21st special electrical observations were taken on the day of the eclipse and on six other days, while special cloud observations were made on six days.

The cup anemograph has had its annual cleaning.

The height of the pressure tube anemometer has been altered by Mr. Munro, whose representatives were at the observatory on August 21st and 25th; alterations were also made to improve the accuracy of the records. The work was done under Mr. Whipple's supervision.

The testing of the three dip circles ordered from Mr. Dover on behalf of the Magnetic Survey of Russia has been completed. Photographic paper has been supplied to Eskdalemuir Observatory.

The Indian pendulums and other pendulum apparatus which it was agreed to lend to the South Kensington Museum have been duly handed over to the museum. The Superintendent was away on holiday from August 24th.

(September).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	5
	Inclination	5
	Horizontal force	5
Potential gradient		on 19 days.
Wilson apparatus		„ 12 „
Ebert „		„ 12 „
Pyrheliometer		„ 18 „

International cloud observations were made on three days.

An inter-comparison was made of the pyrheliometers belonging to Kew and Eskdalemuir Observatories.

The dividing on the Kew standard unifilar magnetometer having become too faint for satisfactory measurement of the deflection angles, the circle has been re-divided by Mr. Dover.

A unifilar magnetometer made by Messrs. Cooke for the United States Coast and Goedetic Survey has been having its constants determined. Special observations are being made with it by request of the Survey.

Mr. Brame was absent on leave from September 7th to 19th. The Superintendent was absent on holiday from September 22nd.

The Caretaker and Mrs. Corrin were absent on leave from September 23rd. During their absence their duties were performed by Mr. and Mrs. Parfitt, who occupied the Caretaker's apartments.

Miss K. R. Corrin was absent on leave from September 22nd.

The changes made by Mr. Munro, under Mr. Whipple's supervision, have made the effective height of the pressure tube practically the same as that of the cup anemometer, viz., 65 feet above the general level. This compares with about 40 feet for the tube anemometer near the gate.

Eskdale (June).—Staff.—Mr. Dines was away on inspection duty from June 1st–9th inclusive.

Mr. Skelton left for his holidays on June 10th.

Mr. Richardson left on inspection duty on June 15th.

The absence of Mr. Skelton has rendered some occasional overtime necessary to cope with the work.

Grounds and Buildings.—Messrs. Ryle, Galletly, Tulley, and Quigley came from the Office of Works on June 5th and went into many matters requiring attention. Nothing has yet been started.

Magnetics.—The usual observations have been made. The inductor is permanently installed in the E hut and regular weekly observations are being made with it, and with the dip circle in the W hut.

The determination of the azimuth lines in the W room of the underground has been completed and two separate lines are now available in both E and W rooms.

The tabulations are in the following state :—

——	N.	W.	V.
Read once	To date	To date	To date.
Read twice	To date	To date	To date.
P and Q	Jan. 31st	Jan. 31st	Jan. 31st.
Individual base values ...	Jan. 31st	Jan. 31st	Jan. 31st.
Monthly sheets begun... ...	Sept., 1913	Sept., 1913	Not yet.
„ finished ...	May, 1913	Not yet	Not yet.

Meteorology.—The usual work has been continued, but Mr. Skelton's absence has reduced the possibilities of balloon flying and cloud photography.

Atmospheric electricity.—The curves have been read up to date. A large amount of work remains to be done on the 1913 figures before they can be ready for the new scheme of publishing separate averages for different types of days.

Seismology.—The instruments are running as usual.

The two horizontal Galitzin pendulums were stardardized by Messrs. Richardson and Dines on June 13th. This operation had not been thoroughly performed for two years. No serious departure was found from the values then obtained, which have been used for the microseismic data for 1913.

Car.—This has given the service required of it. Mr. Stonier now drives it when required. As it was not urgently required during Mr. Richardson's absence the opportunity has been taking of effecting some repairs per Messrs. Dines and Stonier.

(July).—Staff.—The Director was at the Observatory from 15th to 21st.

During the greater part of the month two of the staff have been absent owing to ordinary leave or to illness.

Grounds and Buildings.—About a dozen men are at work on the premises under the supervision of Mr. Sidle, of H.M. Office of Works. They have relined the reservoir and it now appears to be free from leaks. A new kitchen range has been installed in the caretaker's house in place of the one which was cracked. The other works in progress comprise :—Refelting and tarring the roofs of the huts, fitting additional radiators in the two smaller offices, laying a gas pipe to the Beckley raingauge, moving the gates from the yard outside the garage to the top house, lowering the end of the water pipe which catches the water on the distant hillside, fitting picture rails round the official guest rooms, overhauling the sewage works, and various other repairs.

A thorough examination of the magnet house was made while the Director was here, and at his instructions flames have been kept burning under the lower ends of the three 2″ copper tubes. Each flame burns 21 litres of acetylene per hour. Since this was done the temperature of the E room has been rising at about twice the rate usual to this time of year. The wood floor of the W room has been carried outside to dry.

Magnetics.—Absolute observations have been made weekly except that the dip circle has not been used owing to absence of staff.

The tabulations are in the following state :—

——	N.	W.	V. From Aug. 1, 1913.
Read once	To date	To date	To date.
Read twice	To date	June 29th	To date.
P and Q	Jan. 31st	Jan. 31st	Jan. 31st.
Individual base values ...	Jan. 31st	Jan. 31st	Jan. 31st.
Monthly sheets begun... ...	Sept., 1913	Sept., 1913	Not yet.
„ finished ...	May, 1913	Not yet	Not yet.

Meteorology.—The usual work has been continued. Thirteen pilot balloon ascents have been observed.

Atmospheric Electricity.—The curves are read up to date and the matter for the Geophysical Journal has been finished for September, 1913. The monthly tabulations for 1913 have yet to be begun under the new system.

Seismology.—The tabulations are finished to March, 1914, except the microseisms for November and December, 1913. Some notes on the installation of seismographs have been drawn up for Umtata observatory.

Photographic prints of Galitzin records have been sent to Prince Galitzin and to Professor Hecker.

A paper is being prepared for the Edinburgh Conference.

(August.)—Staff.—Mr. and Mrs. Stonier, Mr. Harris, Mr. Laidlaw, and Mr. Beck have been away for parts of the month. Mr. Dines is now on leave. Mr. Nichols arrived on the 10th and has been occupied with electrical observations and the annual magnetic tabulations.

Grounds and buildings.—The various operations mentioned in the July report as having been taken in hand by the Office of Works are now completed. The reservoir has been standing full in spite of some rather dry weather. The roofs of the huts have been made watertight by covering them with new felt, and it has been thought unnecessary to tar them. A motor pit has been constructed.

Mr. Simpson, of H.M. Office of Works, visited the Observatory on 30th July.

Oil lamps have been kept burning under the vertical copper flues in the underground magnet house, and the temperature in the East Room is to-day 0·9° C. higher than on the same date last year. The opening of the inlet flues does not appear to have had any bad effect on the steadiness of the temperature in the inner room. Condensation has been profuse.

Magnetics.—Absolute observations have been made as usual, except that the dip circle is waiting for the return of staff.

The tabulations are in the following state :—

——	N.	W.	V. From Aug. 1, 1913.
Read once	To date	To date	To date.
Read twice	July 20th	Aug. 3rd	July 25th.
Converted to γ	End of 1913.	End of 1913.	
P and Q	April.	April.	
Individual base values ...	Jan.	Jan.	Jan.
Final base values	Sept., 1913	Sept., 1913	Sept., 1913.
Monthly sheets begun... ...	Sept., 1913	Sept., 1913	Not yet.
„ finished ...	May, 1913	Feb., 1913	Not yet.

The annual magnetic tabulations for 1913 are now being pushed forward by all the Office staff.

Meteorology.—The usual work has been continued. 7h. 15m. has been adopted as the proper time for flying balloons. A graph has been prepared, as a guide to the cloud photographer, giving the exposure as a function of the sun's elevation.

Atmospheric electricity.—Mr. Dines has the annual tabulations for 1913 in hand. Mr. Nichols has instituted observations of ionization and conductivity hourly from 4h. to 20h. on a number of days.

Seismology.—The Galitzins are in order. The Omori clock is away for repair.

Solar eclipse.—Electrical observations and cloud photographs were made hourly from 4h. to 20h. on this day. Unfortunately many of the photographs were spoilt. The clouds did not permit of pyrheliometer observations. Two meteorographs were sent up at such times as should cause them to be at their highest points one 45 mins. before, the other 45 mins. after the maximum phase of the eclipse. Information is being prepared for Dr. Bauer, Washington, and Herr V. Carlheim-Gyllensköld, Stockholm.

(September).—Staff.—The regular staff have all been at work. In addition we have had the assistance of Mr. Nichols from Kew until the 25th.

Underground Magnet House.—The oil lamps have been kept burning under the exit shafts. The temperature in the E room is now 13·3° C. which is 1·6° C. higher than on the same date last year.

The amount of water mopped up from the trench has recently increased to a remarkable extent, as the following table shows :—

January	·1	litre.
February	·4	„
March	·04	„
April	·04	„
May	·06	„
June	·3	„
July	·2	„
August	3·3	litres.
September	15·0	„

Condensation has now ceased and on September 17th calcium chloride was introduced to the amount of 50 kilograms.

In the N.E. corner a brown growth has been found upon the lath which lines the outer wall. A sample has been sent to the Office of Works.

Magnetics.—Absolute observations have been made weekly as usual. Mr. Skelton has been practising on the dip circle.

The tabulations are in the following state :—

——	N.	W.	V. From Aug. 1, 1913.
Read once	To date	Present month ...	To date.
Read twice	Aug.	July	July.
Converted to γ	Feb.	Dec.	Dec.
Individual bases	May	May	April.
Smoothed bases	March	March	Dec., 1913.
Monthly sheets finished ...	Dec., 1913	Dec., 1913	Aug., 1913.

The vertical force curves in the months January to July, 1913, have been thoroughly examined by Mr. Dines and myself, and discussed with Dr. Chree. As a result . hourly values are being prepared for April and May, and inequalities only for June and July. This is the most that can be done.

The Office staff are all at work upon the annual tables for 1913.

At the request of Professor Henry Briggs, of Heriot Watt College, the value of the mean declination for 1913 has been sent to him.

Meteorology.—The usual observations and tabulations have been continued.

Atmospheric electricity.—Mr. Nichols has made observations of ionization and conductivity at 15h. on most days, and again in many cases at sunset.

The annual tabulations for 1913 are waiting until the corresponding magnetic tables are finished. The curves are read up to the present month.

Seismology.—The tabulations for May are complete. The Omori clock has been away for repair.

The charging of an accumulator has always been an awkward problem at the Observatory. Dr. Harker made a step forward by lending two thermopiles. Recently the Office of Works, by improving our water supply, has made it possible to use a small water-motor in the stable without causing a drought. Mr. Dines has designed a turbine which, with a suitable dynamo, gives 5 volts 1·5 amps.

Benson (April, May and June).—The station has now been got into proper order after the move and the work is being carried on as usual.

No balloon could be sent up in April, but balloons have been sent up on the other international days and on several other occasions; instruments have also been supplied to Eskdalemuir and to Limerick.

The quarter has again been very unfortunate in the matter of finding the balloons, since only five instruments have been returned (two only of those from Benson) and the curious trouble that occurs when instruments are sent to Limerick continues and remains unexplained.

(July, August and September).—Mr. Dines was away during August, but the balloon ascents throughout the quarter on the international days have been made without interruption, including the day of the partial solar eclipse.

The ill-fortune of the previous quarter has continued and only three instruments have been returned.

Owing to the war it has become very difficult to obtain balloons, and hence ascents have been confined to the international days. Only two balloons are left in stock, and though Mr. Dines has applied to some four or five firms he cannot yet obtain any more. Attempts were made at Pyrton Hill during 1908 to use some other form of balloon, but were not successful ; if, however, rubber balloons really cannot be obtained, some other plan must be tried.

Also, owing probably to the war, there are no receipts for the sale of apparatus, but Baker's time has been and still is fully occupied in fitting up the station with recording instruments.

Meteorological Observations at Holywell, Flintshire, 1793 to 1835.—In the library collected by Messrs. Thomas and David Pennant, at Downing Hall, Holywell, Flintshire, have recently been found six volumes of manuscript observations, which appear to have been taken by Mr. David Pennant, at Downing Hall. The period covered extends from 1794 to 1834, with a few observations in July and August, 1793, and from January to March, 1835. No observations are given for 1799.

In January, 1794, the record is described as a "Meteorological Journal kept at Rose Hill"; this is Rose Hill, Marple, Cheshire, and the observations consist of readings of thermometer, barometer, wind and weather, with phenological notes and remarks. Up to 1803 observations were taken generally three times a day, about 8 to 9 a.m., noon to 4 p.m., and 10 to 11 p.m. After this date there were two observations daily, at 8 a.m. and 2 p.m., until November, 1831, and after that observations at 8 a.m. only.

Observations of pressure and wind are very incomplete during 1794, 1795, and the early part of 1796, but after September of the latter year they form a continuous record. On May 9th, 1794, the record was transferred from Rose Hill to Downing, thenceforth for more than a year it is sometimes at one place, sometimes at the other, but in September, 1795, the place of observation seems to have been finally transferred to Downing, and thenceforth to the end of the record we find no further reference to observations at Rose Hill.

Among the phenological observations are given dates of flowering of plants, and agricultural notes. Frequent references are given to the price of corn, and to the general health of the countryside. Among other notes one in January, 1800, is interesting as describing an occurrence of glazed frost : "In consequence of a singular fall of sleet the house, ground, trees, and every blade of grass appeared encrusted with a coat of the most transparent glass—many boughs of trees were broken by its weight." On January 21st, 1802, was a hurricane—"most violent ever remembered" ; detailed accounts of the damage done by this and other storms, and by lightning, etc., are given both in manuscript notes and in clippings from newspapers. One of these latter records thermometer readings of 3° F. at Kingston and 0° F. at South Lambeth in January, 1795.

On August 5th, 1806, there is a note "Fixed pluviometer in upper Garden." From that date pluviometer readings are given occasionally, and from November, 1806, to March, 1808, the monthly totals are given at the end of each month. In March, 1813, however, the readings of the pluviometer cease to appear ; no indication is given of the nature of the instrument or of the maker's name.

Towards the close of the record the penmanship, firm and clear in the earlier years, gradually becomes shaky and uncertain, though retaining its legibility to the last ; observations are taken at only one hour, 8 a.m., and the long, careful description of meteorological phenomena disappear. On February 2nd, 1835, the record finally ceases, after extending, with a few slight gaps, for over 40 years, a wonderful record for a single observer, and all the more so considering the rarity of connected observations and the uncoordinated state of meteorology at the time.

Harvest Forecasts.—*Notifications of spells of settled weather.*—In consequence of the curtailment of the information received at the Office from foreign stations, the issue of notifications in connexion with spells of settled weather had to be brought to a premature conclusion. The shrinkage in the number of applications for these notifications is due to some extent to this cause. Notices were sent out to only 60 correspondents as compared with 111 last year and 87 in 1912, though many of these entered their names for two or more sets of telegrams.

The occasions on which the weather assumed a definitely settled type were not very frequent during June and July, but in all seven notifications were issued before the suspension of the service in the middle of August.

(1) The first notification was issued at 3 p.m. on 16th June to England and Southern Ireland. The pressure distribution was not of the definite anticyclonic type which is recognised as being that most favourable to prolonged settled weather, but the conditions appeared to justify the issue of a notice, "Chances favourable for continuation of fair weather next few days." The notification was followed by three or four further days of dry weather over England except in a rather narrow belt extending from North to South across the country. Here thunderstorms, violent in places, were experienced on the afternoon of the 18th, within two days of the issue of the first telegram. Notification of local thunderstorms had been issued on the morning of the 18th. Further thunderstorms were experienced in the East and South-east of England on the 19th. On the morning of the 20th, notice of a spell of unsettled weather was issued, and showers duly followed during the late afternoon or night in most parts of the country. In the South of Ireland the weather remained broken throughout.

(2) A second notice was issued with rather greater confidence on the afternoon of 25th June. Practically no rain had fallen for two days previously. Apart from light showers in the district

between Birmingham and the South coast on the evening of 30th June, no rain fell until 1st July, five days after the issue of the telegram. On the morning of 1st July a notice of approaching thunderstorms was circulated and storms became general during the afternoon and evening. On the morning of 2nd July notice of a spell of unsettled weather was circulated. Rain fell in greater or less quantities in most parts of the country during the following days up to and including 8th July.

(3) On 9th July the conditions appeared rather more settled, sufficiently so to justify the issue of a telegram "Outlook moderately favourable to continuance of dry weather" to the English district. The notice was extended on the following day to Ireland and Scotland. Notices of approaching thunderstorms had to be issued on the morning of 12th July, and of a definite change in the conditions on 13th July. Three or four days of dry weather followed the original notifications over a broad stretch of country in the East and also in South Wales, the Cornish Peninsula and Ireland, corresponding approximately with the forecast districts 1, 2, 3, 4*a*, 8 and 10. Thunderstorms occurred on the 11th, within two days of the issue of the notifications in the remaining parts of the country, districts 6, 7, 4*b* and 5.

(4) A notice issued on 22nd July to the Western districts proved a failure in consequence of the unexpected development of a low pressure system over the mouth of the Elbe and Scandinavia, which proved of sufficient importance to cause rain in all parts of the United Kingdom.

(5) The weather remained unsettled, though there were long fine intervals for several days subsequently. On 29th July the afternoon observations again appeared moderately favourable and notices were circulated, but already on 31st July, two days later, notice of an impending break up had to be issued, as the morning observations showed a depression off the Irish Coasts. This spread eastward during the day and caused rain in all districts.

(6) After the declaration of war on 4th August, the receipt of information from the continent and and from the Atlantic Ocean by wireless reports became very irregular and the issue of special notifications became more than ordinarily hazardous in consequence. On the morning of 11th August an anticyclone had become established over Southern England and the issue of a notice of continuation of fair weather seemed justified. Except for slight rain in the West of Scotland on the 11th, no rain fell on 11th, 12th, and 13th August. On the morning of the 14th notice of the approaching break up was issued to the North and West and extended to all parts of the country in the evening. Thunderstorms occurred at night in Ireland and the South-west of England and also in parts of Scotland, and spread during the following day to the South-east of England. In the North-east of England and East of Scotland practically no rain fell until 21st August, ten days after the despatch of the first telegram of the spell.

(7) Though the foreign information had shrunk still further, another notice was issued on 17th August. No rain fell on that day or the two following days, but on the 20th it appeared prudent to issue notice of the probability of a change to less settled conditions in consequence of the appearance of a depression off our West coasts. Rain fell in Ireland on the 20th and in Scotland and England on the 21st.

As the receipt of continental telegrams and of wireless reports from the Atlantic Ocean had ceased entirely, notice of the discontinuance of the issue of a "further outlook" or of notifications in connexion with spells of fair weather was issued to all subscribers. The limited information available did not justify the issue of forecasts covering a period of more than 24 hours.

Thus, of the seven sets of notifications issued, two proved completely successful, four only partially successful, inasmuch as rain fell in some of the districts to which the notices had been addressed within less than three days. One notice, that of 22nd July, must be classed as a failure.

Royal Agricultural Show at Shrewsbury.—This show was held at Shrewsbury, 30th June—4th July 1914. The exhibits sent by the Office were in charge of Mr. Gendle. Mr. Lempfert superintended the arrangement of the exhibits and was present on the first two days of the Show.

Two new diagrams were prepared for exhibition on this occasion. (*a*) Weather through the centuries—a record of floods, gales &c. since 1000 A.D. and (*b*) A coloured diagram showing "Favourable conditions for Crops" based on Mr. Hooker's work for the Eastern Counties.

Mr. Gendle reports that the latter diagram attracted considerable attention. It is highly desirable that correlation figures for other districts should be prepared. No new researches on the relations between Meteorology and Agriculture were illustrated this year; the visitors who attend the Show each year are likely to be disappointed when there is nothing really fresh for them to see.

The weather during Show week was remarkable for extreme heat and a heavy thunderstorm; the forecasts supplied from the Office were quite successful.

On Friday, 3rd July, the Show was visited by His Majesty the King, who spent some time examining the instruments included in the Meteorological Office exhibit, and showed great interest in the records of the storm of the previous day.

Cost of Exhibit:—

	£	*s.*	*d.*
Carriage	7	3	9
Personal and travelling expenses	14	15	8
Furnishing stall: preparation of diagram &c., &c.	3	2	3
	£25	1	8

Accounts.—Reported—that Mr. Albert Jordan, M.Sc., had offered his services as a temporary voluntary assistant, and that the sum of £1 had been paid to him for services rendered in connexion with the tabulation of 7 a.m. and 6 p.m. values of pressure and wind &c. over the Atlantic, for the Board of Trade inquiry into the state of weather over the Atlantic in the past ten years.

Approved.

Submitted—the following :—

SUPPLY OF PRINTED FORMS ON REPAYMENT.

REVISED SCHEDULE OF CHARGES. (*See* Minute 163.)

Form	Description.	Prices to be charged, including departmental expenses.					Corresponding amounts to be credited to S O.				
		Single copy.	One dozen copies.	100 copies.	Year's Supply.		Single copy.	One dozen copies.	100 copies	Year's Supply.	
					Number.	Price.				Number	Price.
		s. d.	*s. d.*	*s. d.*		*s. d.*	*s. d.*	*s. d.*	*s. d.*		*s. d.*
073	Fishery Barometer Diagram (with illustration)	—	0 8	4 2	13	0 8	—	0 6	3 6	13	0 6
131	Meteorological Log Book	2 4	—	—	—	—	2 0	—	—	—	—
133	„ Original Note Book	2 0	—	—	—	—	1 8	—	—	—	—
135	Lighthouse Registers	3 0	—	—	—	—	2 6	—	—	—	—
216	"Weather Prospects" (Forecast Form)	—	0 5	2 1	—	—	—	0 3	1 9	—	—
223	Forecast Inquiry Form (Type of Pressure Distribution)	—	0 6	3 0	—	—	—	0 4	2 6	—	—
226	Large Working Map (*See also* 258, 258*a*)	0 4	2 4	16 4	—	—	0 2	2 0	14 0	—	—
227	Door Board Maps : N.W. Europe (Blue, with Names of Stations) ...	0 1	0 8	4 2	—	—	0 0½	0 6	3 6	—	—
228	Chart of North Western Europe (Red)	0 1	0 8	4 2	—	—	0 0½	0 6	3 6	—	—
233	Pocket Register : Telegraphic Reporting Stations	2 4	—	—	—	—	2 0	—	—	—	—
249	Frontispiece Map to Daily Weather Report	0 2	1 2	8 2	—	—	0 1	1 0	7 0	—	—
251	Chart of Europe, N. Atlantic and N. America	0 2	1 2	8 2	—	—	0 1	1 0	7 0	—	—
254	Daily Weather Report (Blue Stone)	0 2	0 10	5 10	—	—	0 1	0 8	5 0	—	—
258 258*a*	Large Working Map (*See also* 226)	0 4	2 4	16 4	—	—	0 2	2 0	14 0	—	—
301	International Form "A"	—	0 5	2 1	13	0 5	—	0 3	1 9	13	0 3
302	Normal Climatological Summary	—	0 5	2 1	—	—	—	0 3	1 9	—	—
313	Telegraphic Reporter's Monthly Return	—	1 2	8 2	13	1 2	—	1 0	7 0	13	1 0
317	Specification of Beaufort Scale of Wind Force	0 1	0 6	3 0	—	—	0 0½	0 4	2 6	—	—
330	Notes on the Equipment of a Meteorological Station (Catechism) ...	—	0 8	4 2	—	—	—	0 6	3 6	—	—
331	Daily Values of Elements for a series of years	—	0 8	4 2	13	0 8	—	0 6	3 6	13	0 6
332 333	Lustrum Average Form	—	0 8	4 2	—	—	—	0 6	3 6	—	—
335	Fishery Barometer Diagram (small size)	—	0 6*	3 0	13	0 6	—	0 4†	2 6	13	0 4
339	P.T. Anemogram : Analysis of Records	—	0 10	5 7	13	0 10	—	0 8	4 9	13	0 8
340	Weekly Climatological Report	—	0 5	2 1	54	1 2	—	0 3	1 9	54	1 0
346	Monthly Rainfall Return	—	0 5	2 1	13	0 5	—	0 3	1 9	13	0 3

* 10*d.* per pad containing 25 copies.

† 8*d.* per pad containing 25 copies.

Form	Description.	Prices to be charged, including departmental expenses.					Corresponding amounts to be credited to S.O.				
		Single copy.	One dozen copies.	100 copies.	Year's Supply.		Single copy.	One dozen copies.	100 copies.	Year's Supply.	
					Number.	Price.				Number.	Price.
		s. d.	*s. d.*	*s. d.*		*s. d.*	*s. d.*	*s. d.*	*s. d.*		*s. d.*
347	Monthly Return (2 observations daily)	—	1 2	8 2	13	1 2	—	1 0	7 0	13	1 0
348	„ „ (1 observation daily)	—	0 8	4 2	13	0 8	—	0 6	3 6	13	0 6
355	„ „ (3 observations daily)	—	1 2	8 2	13	1 2	—	1 0	7 0	13	1 0
360	Pocket Register for Normal Climatological Observations	1 10	—	—	—	—	1 6	—	—	—	—
362	Blank Chart of British Isles (4to.)	—	0 8	4 2	—	—	—	0 6	3 6	—	—
366	Outline Charts of the Globe (small)	0 6	4 8	—	—	—	0 4	4 0	—	—	—
„	„ „ „ (large)	4 8	31 0	—	—	—	4 0	28 0	—	—	—
372	Tabulation Form for days of month and year	—	0 5	2 1	—	—	—	0 3	1 9	—	—
398	Conversion Tables : Card	0 4	2 4	16 4	—	—	0 2	2 0	14 0	—	—
399	Hygrometric Tables	4 6	—	—	—	—	3 10	—	—	—	—
401	Hourly Tabulations of Anemograph	—	0 6	3 0	54	1 8	—	0 4	2 6	54	1 4
402	„ „ Barograph	—	0 6	3 0	54	1 8	—	0 4	2 6	54	1 4
403	Hourly Values of Sunshine	—	0 5	2 1	13	0 5	—	0 3	1 9	13	0 3
404	Hourly Tabulations of Thermograph	—	0 6	3 0	54	1 8	—	0 4	2 6	54	1 4
407	Subsidiary Hourly Measurements of Anemograph	—	0 6	3 0	54	1 8	—	0 4	2 6	54	1 4
408	„ „ „ Barograph	—	0 6	3 0	54	1 8	—	0 4	2 6	54	1 4
409	„ „ „ Thermograph	—	0 6	3 0	54	1 8	—	0 4	2 6	54	1 4
410	Hourly Values of Rain and Weekly Barograph and Thermograph Journal	—	0 5	2 1	54	1 2	—	0 3	1 9	54	1 0
411	Register of Weather and Cloud	—	0 5	2 1	54	1 2	—	0 3	1 9	54	1 0
414	Copy of Sunshine Record	—	0 5	2 1	54	1 2	—	0 3	1 9	54	1 0
417	Pilot Balloon Ascents (Two Theodolites) single sheets	—	0 6	3 0	—	—	—	0 4	2 6	—	—
„	„ „ „ „ double „	—	0 10	5 10	—	—	—	0 8	5 0	—	—
418	„ „ „ (One Theodolite)	—	0 6	3 0	—	—	—	0 4	2 6	—	—
422	Electrograph Working Form	—	0 5	2 1	54	1 2	—	0 3	1 9	54	1 0
425	„ Tabulations	—	0 6	3 0	54	1 8	—	0 4	2 6	54	1 4
426	Magnetograph „	—	0 6	3 0	54	1 8	—	0 4	2 6	54	1 4
427	Observations of Deflection	—	0 8	4 2	—	—	—	0 6	3 6	—	—
428	Vibration Experiment	—	0 8	4 2	—	—	—	0 6	3 6	—	—
429	Magnetic Dip	—	0 8	4 2	—	—	—	0 6	3 6	—	—
430	Tabulation Form (every hour for a month)	—	0 8	4 2	13	0 8	—	0 6	3 6	13	0 6
434	Observations of Absolute Declination	—	0 8	4 2	—	—	—	0 6	3 6	—	—
505	Fishery Barometer Inspection (England)	—	0 6	3 0	—	—	—	0 4	2 6	—	—
506	„ „ „ (Ireland)	—	0 6	3 0	—	—	—	0 4	2 6	—	—
507	„ „ „ (Scotland	—	0 6	3 0	—	—	—	0 4	2 6	—	—
525	Dines's Kite Meteorograph Charts	0 5	3 6*	—	—	—	0 3	2 0	—	—	—
526	Semi-logarithmic paper...	0 5	3 6	—	—	—	0 3	3 0	—	—	—

529	Large Barograph Chart for Telegraphic Stations	—	0	8	4	2	54	2	4	—	0	6	3	6	54	2	0
530	Small „ „ „ „	—	0	6	3	0	54	1	8	—	0	4	2	6	54	1	4
531	Small Barograph Chart (28 to 31 inches)	—	0	6	3	0	54	1	8	—	0	4	2	6	54	1	4
532	„ „ „ (25 to 28 inches)	—	0	6	3	0	54	1	8	—	0	4	2	6	54	1	4
533	Large „ „ (28 to 31 inches)	—	0	8	4	2	54	2	4	—	0	6	3	6	54	2	0
534	Small „ „ (Tracing) (28 to 31 inches)...	—	0	6	3	0	54	1	8	—	0	4	2	6	54	1	4
535	Micro-Barograph Chart...	—	0	8	4	2	400	16	4	—	0	6	3	6	400	14	0
536	Small Barograph Chart (950–1050 mb.)	—	0	6	3	0	54	1	8	—	0	4	2	6	54	1	4
537	Large „ „ „	—	0	8	4	2	54	2	4	—	0	6	3	6	54	2	0
538	„ „ „ (930–1030 mb.)	—	0	8	4	2	54	2	4	—	0	6	3	6	54	2	0
539	Float Barograph Chart	—	0	8	4	2	54	2	4	—	0	6	3	6	54	2	0
540	Callendar Radiograph Chart	—	0	8	4	2	400	16	4	—	0	6	3	6	400	14	0
542 } 543 }	„ Thermograph Chart	—	0	8	4	2	400	16	4	—	0	6	3	6	400	14	0
545	Dines's Anemograph Chart (7.30 a.m.)	—	0	8	4	2	54	2	4	—	0	6	3	6	54	2	0
547	Small Thermograph Chart (10°–100° F.)	—	0	6	3	0	54	1	8	—	0	4	2	6	54	1	4
548	„ „ „ (260°–310° Absolute)	—	0	6	3	0	54	1	8	—	0	4	2	6	54	1	4
549	Large „ „ (30°–105° F.)	—	0	7	3	6	54	2	0	—	0	5	3	0	54	1	8
550	„ „ „ (–10°– 65° F.)	—	0	7	3	6	54	2	0	—	0	5	3	0	54	1	8
551	Halliwell Rain Gauge Chart (6 p.m.)...	—	0	8	4	2	400	16	4	—	0	6	3	6	400	14	0
552	„ „ „ (9 a.m.)	—	0	8	4	2	400	16	4	—	0	6	3	6	400	14	0
553	Beckley Rain Gauge Chart (Inches)	—	0	5	2	1	400	8	2	—	0	3	1	9	400	7	0
554	„ „ „ (Tracing)	—	0	5	2	1	400	8	2	—	0	3	1	9	400	7	0
555	Hyetograph Chart	—	0	6	3	0	400	11	8	—	0	4	2	6	400	10	0
556	Beckley Rain Gauge Chart (mm.)	—	0	5	2	1	400	8	2	—	0	3	1	9	400	7	0
557	Hygrograph and Thermograph Chart (Summer)	—	0	8	4	2	400	16	4	—	0	6	3	6	400	14	0
558	„ „ „ „ (Winter)																
559	Hygrograph Chart	—	0	6	3	0	54	1	8	—	0	4	2	6	54	1	4
560	Dines's Anemograph Chart (Direction and Velocity)	—	0	9	4	8	400	18	8	—	0	7	4	0	400	16	0
561	Robinson Anemograph Chart (Standard)	—	0	9	4	8	400	18	8	—	0	7	4	0	400	16	0
562	„ „ „ (Tracing)	—	0	7	3	6	400	14	0	—	0	5	3	0	400	12	0
563	„ „ „ (5″ Cup)	—	0	7	3	6	400	14	0	—	0	5	3	0	400	12	0
564	Dines's Anemograph Chart (10 a.m.)...	—	0	8	4	2	400	16	4	—	0	6	3	6	400	14	0
566	„ „ „ (9 a.m.)	—	0	8	4	2	400	16	4	—	0	6	3	6	400	14	0
567	„ Baxendell Anemograph Chart (Wind Direction)	—	0	9	4	8	400	18	8	—	0	7	4	0	400	16	0
567*a*	Rosyth Anemograph Chart (Wind Direction)	—	0	8	4	2	400	16	4	—	0	6	3	6	400	14	0
570	Dines's Anemograph Chart (Direction and Velocity)	—	0	9	4	8	400	18	8	—	0	7	4	0	400	16	0
571–585	Sunshine Cards†	—	0	10	5	10	400	22	0	—	—	—	—	—	—	—	—
592	Large Thermograph Chart (250°–292° Absolute)	—	0	7	3	6	54	2	0	—	0	5	3	0	54	1	8
	Cardboard Boxes to hold 1 year's supply of Sunshine Cards	0	4	3	6	—	—	—	—	—	—	—	—	—	—	—	—
Circ. 301	Requirements of a Normal Climatological Station...	0	5	3	6	—	—	—	—	0	3	3	0	—	—	—	—
„ 202	Change of Units of Measurements	0	1	0	5	2	1	—	—	0	0½	0	3	1	9	—	—
„ E·01	Syllabus of Weather Study for Elementary Schools	1	0	—		—		—	—	—		—		—		—	—
„ E·04	Catalogue of twelve sets of lantern slides	1	0	—		—		—	—	—		—		—		—	—

* 1*s.* per dozen is credited to Incidental Expenses, against cost of engraving plate.

† Charge for year's supply to approved stations is £1.

Submitted—The following Statement of Accounts for the Quarter ending 30th June, 1914 :—

RECEIPTS.						PAYMENTS.					
1913.				1914.		1913.				1914.	
£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
95 17 9	Balance from year 1913-14	—		1,250 16 8		250 0 0	Director	—		250 0 0	
5,000 0 0	Parliamentary vote.	—		5,000 0 0			OFFICE SALARIES (including Insurance):				
						1,910 10 2	Monthly	2,046 16 5			
						235 4 8	Weekly	286 14 1			
	DEPARTMENTAL EXPENSES REPAID:									2,333 10 6	
52 11 0	Forecasts, &c. ...	41 17 5					EXPENSES OF OFFICE:				
	Marine, Statistical, and Administrative					173 12 2	Rent, Heating, and Lighting	171 4 0			
29 7 9		21 9 6				31 6 11	Furniture and Equipment	8 0 11			
15 17 7	Instruments ...	8 8 7					Library	25 0 1			
				71 15 6		151 18 1	Insurances, Repairs, Incidental Expenses, and Consumable Stores ...	65 15 11			
	INCIDENTAL EXPENSES REPAID:									270 0 11	
104 5 1	D.W. Report ...	96 12 10					POST OFFICE:				
32 4 4	Divisional... ...	32 8 11				166 0 0	Postage	200 13 3			
				129 1 9		—	Telephones	80 16 2			
16 2 5	STATIONERY OFFICE	—		18 13 3		91 1 2	Telegrams	705 16 8			
										987 6 1	
	TELEGRAPH										
227 13 7	CHARGES REPAID	—		379 3 4		—	STATIONERY OFFICE...	—		47 8 10	
						178 0 0	TRAVELLING EXPENSES	—		137 16 4	
	TELEPHONE										
—	CHARGES REPAID	—		2 0 9		205 4 6	SUPERANNUATION: Funded Annuities ...	240 12 6			
							Non-funded pensions .	137 19 6			
114 19 6	INSPECTIONS ...	—		124 0 0		158 17 9	Contribution to fund .	541 0 0			
										919 12 0	
	INSTRUMENTS:						COST OF INSTRUMENTS:				
2 2 6	Royal Navy ...	0 19 0				245 13 11	Royal Navy	89 19 9			
	Mercantile Marine,						Mercantile Marine,				
864 6 2	Stations, &c. ...	225 15 8				625 5 9	Stations, &c. ...	524 18 2			
				226 14 8						614 17 11	
	SUPERANNUATION ACCOUNT:						*OBSERVATORIES, BRANCHES, AND STATIONS:				
178 15 0	Annuities... ...	205 4 9				431 11 10	Kew	717 6 10			
	Interest on Investments					287 4 1	Eskdale	348 14 6			
13 4 10		8 12 6				127 8 4	Valencia	153 14 10			
				213 17 3		76 8 9	Farnborough ...	147 11 6			
	*OBSERVATORIES, BRANCHES, AND STATIONS:						Falmouth	43 10 5			
						510 11 0	Benson (net expenditure)	158 1 6			
104 9 9	Kew	103 10 6					Miscellaneous ...	352 19 6			
500 0 0	Eskdale	514 5 5								1,921 19 1	
14 7 11	Valencia	8 15 0					LECTURES AND EXPERIMENTS	—		112 10 0	
—	Farnborough ...	266 8 3				—					
—	Falmouth... ...	2 7 8					BALANCE:				
						1,499 17 7	Cash at Bank ...	796 10 1			
26 16 0	Miscellaneous ...	26 5 10				69 2 0	,, at Office ...	75 11 7			
				926 12 8			Advance for Inspections				
	LECTURES AND EXPERIMENTS ...					30 0 0		—			
61 17 6		—		124 7 6						872 1 8	
£7,454 18 8				£8,467 3 4		£7,454 18 8				£8,467 3 4	

* For details, see separate statement.

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
2,183 8 0	To sundry creditors	3,032 19 8		1,598 19 7	By cash at Bank and at Office ...	872 1 8	
—	,, salaries reserved	2 3 1		0 2 9	,, salaries reserved	—	
135 5 0	,, superannuation	—		377 2 7	,, M.O. instruments in stock ...	†1,088 18 8	
616 15 11	,, balance	40 0 8		690 12 7	,, sundry debtors	987 5 4	
				268 11 5	,, Admiralty	126 17 9	
£2,935 8 11		£3,075 3 5		£2,935 8 11		£3,075 3 5	

NOTES.—(1) On 30th June the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £81 18*s.* 4*d.*
(2) These accounts are subject to audit by the Comptroller and Auditor-General.
† Including £537 16*s.* for instruments ordered and received on repayable requisition.

Observatories.—Statement of Accounts for the Quarter ended 30th June, 1914 :—

KEW.

1913. £ s. d.	Receipts.	1914. £ s. d.	1913. £ s. d.	Payments.	1914. £ s. d.
93 15 0	Subventions, Scott Antarctic Fund	41 0 0		Salaries, Scheduled 418 3 6	
	Gassiot Trust ...	—		Sunday and holiday duty 5 16 7	
2 10 0	Expenses refunded locally ...	2 10 0		Extra Assistance 6 5 0	
8 4 9	Tests and Commissions	61 7 6			
—	Cost of books and forms refunded	3 13 0	368 13 1		430 5 1
327 2 1	Balance	608 16 4	—	Cost of forms, &c.	10 10 9
			9 17 0	Rent, Rates, Taxes, Repairs and Insurance	169 6 10
			20 15 8	Fuel and lighting	28 1 5
			1 1 0	Equipment and instruments ...	52 17 11
			9 11 5	Consumable stores	3 6 3
			21 0 2	Incidental expenses...	8 14 6
			13 6	Books, &c.	—
			—	Postage, telephones and telegrams	13 16 1
			—	Travelling expenses...	8 0
£431 11 10		£717 6 10	£431 11 10		£717 6 10

ESKDALE.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
500 0 0	Subvention, Royal Society ...	500 0 0	164 2 2	Salaries, Scheduled	252 6 4
—	Expenses refunded locally ...	14 5 5	16 3 9	Cost of forms, &c.	11 8 7
			16 2 2	Rent, Rates, Taxes, Repairs and Insurance	11 7 9
			14 0 3	Fuel and lighting	8 0 10
			72 4 7	Equipment and instruments ...	12 0 10
			—	Consumable stores	7 13 8
			1 5 10	Incidental expenses...	2 6 5
			—	Books, &c.	1 5 9
			—	Postages, telephones and telegrams	25 8 2
			3 5 4	Travelling and motor car expenses	16 16 2
			212 15 11	Balance	165 10 11
£500 0 0		£514 5 5	£500 0 0		£514 5 5

VALENCIA.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
5 12 11	Subventions (Rosse Fund) ...	—	99 6 5	Salaries, Scheduled...	110 15 4
8 15 0	Expenses refunded locally ...	8 15 0		Costs of forms	1 16 6
113 0 5	Balance	144 19 10	14 16 11	Rent, Rates, Taxes, Repairs and Insurance	25 18 0
				Fuel and lighting	2 0 0
			13 5 0	Postages, telephones and telegrams	13 5 0
£127 8 4		£153 14 10	£127 8 4		£153 14 10

FARNBOROUGH BRANCH OFFICE.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Subvention	250 0 0	62 10 0	Salaries, Scheduled	124 11 9
—	Expenses refunded locally ...	16 8 3		Rent, Rates, Taxes, Repairs and Insurance	9 9
76 8 9	Balance	—		Equipment and instruments ...	8 4 4
			13 18 9	Consumable stores	2 4 0
				Incidental expenses	3 6
				Books, &c.	14 6
				Postages, telephones and telegrams	9 18 0
				Travelling and motor car expenses	1 5 8
			—	Balance	118 16 9
£76 8 9		£266 8 3	£76 8 9		£266 8 3

FALMOUTH WEATHER STATION.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Expenses refunded locally ...	2 7 8	—	R. Corn. Polytechnic Society ...	15 0 0
—	Balance	41 2 9	—	Salaries, Scheduled	15 8 9
			—	Rent, Rates, Taxes, Repairs and Insurance	7 3
			—	Equipment and instruments ...	1 4 10
			—	Incidental expenses	3 7
			—	Postage, telephones and telegrams	6 19 2
			—	Travelling expenses	4 6 10
—*		43 10 5	—*		£43 10 5

* 1913 figures not available.

BENSON.

1913. £ s. d.		1914. £ s. d.	1913. £ s. d.		1914. £ s. d.
—	By credits for instruments supplied	16 6 0	—	Salaries, Scheduled	85 2 0
—	Balance (carried to Office account)	158 1 6	—	Equipment and instruments ...	73 7 6
			—	Consumable stores	13 8 0
			—	Incidental expenses	2 10 0
—*		£174 7 6	—*		£174 7 6

METEOROLOGICAL OFFICE, EDINBURGH.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Balance	87 10 0	—	Subvention	87 10 0
—*		£87 10 0	—*		£87 10 0

MISCELLANEOUS STATIONS.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Cost of forms refunded	26 5 10	—	Subventions (Aberdeen, Armagh)...	86 2 6
—	Balance	239 3 8	—	Salaries of Observers	141 13 1
			—	Overtime	2 6
			—	Rent, Rates, Taxes, Repairs and Insurance	19 3
			—	Equipment and instruments ...	6 3
			—	Incidental expenses	26 2 3
			—	Books, &c.	1 3 6
			—	Postages, telephones and telegrams	9 0 2
—*		£265 9 6	—*		£265 9 6

* 1913 figures not available.

Submitted—The following Statement of Accounts for the six months ending 30th September, 1914:—

RECEIPTS.						PAYMENTS.					
1913. £ s. d.		£ s. d.	1914. £ s. d.			1913. £ s. d.		£ s. d.	1914. £ s. d.		
95 17 9	Balance from year 1913–14	—	1,250 16 8			500 0 0	Director	—	500 0 0		
10,000 0 0	Parliamentary vote	—	10,000 0 0				OFFICE SALARIES (including Insurance):				
	DEPARTMENTAL EXPENSES REPAID:					3,837 6 5	Monthly	4,079 17 8			
92 4 4	Forecasts, &c. ...	76 10 1				463 11 7	Weekly	562 10 11			
55 14 1	Marine, Statistical, and Administrative	36 11 10							4,642 8 7		
26 3 0	Instruments ...	37 15 10					EXPENSES OF OFFICE:				
			150 17 9			345 0 8	Rent, Heating, and Lighting	342 6 6			
	INCIDENTAL EXPENSES REPAID:					224 14 10	Furnitureand Equipment	13 15 4			
198 15 9	D.W. Report ...	178 7 2					Library	35 9 3			
50 6 0	Divisional ...	56 18 11				199 18 6	Insurances, Repairs, Incidental Expenses, and Consumable Stores ...	130 14 2			
			235 6 1						522 5 3		
25 16 2	STATIONERY OFFICE	—	60 4 5				POST OFFICE:				
	TELEGRAPH CHARGES REPAID	—	442 9 4			338 5 2	Postage	397 14 9			
						—	Telephones	81 0 7			
580 9 2						545 12 6	Telegrams	1,378 4 2			
									1,856 19 6		
	TELEPHONE CHARGES REPAID	—	4 10 3			—	STATIONERY OFFICE...	—	47 8 10		
—						379 6 9	TRAVELLING EXPENSES	—	251 10 7		
154 13 0	INSPECTIONS ...	—	148 13 0				SUPERANNUATION:				
	INSTRUMENTS:					410 9 6	Funded annuities ...	483 2 6			
2 2 6	Royal Navy ...	2 0 6					Non-funded pensions	277 5 0			
1,082 16 0	Mercantile Marine, Stations, &c. ...	1,306 15 9				317 3 6	Contributions to fund	541 0 0			
			1,308 16 3						1,301 7 6		
	SUPERANNUATION ACCOUNT:						COST OF INSTRUMENTS:				
383 19 9	Annuities... ...	445 17 3				572 11 5	Royal Navy	130 7 9			
17 0 2	Interest on Investments	9 2 8				915 0 7	Mercantile Marine, Stations, &c. ...	1,823 10 9			
			454 19 11						1,953 18 6		
	*OBSERVATORIES, BRANCHES, AND STATIONS:						*OBSERVATORIES, BRANCHES, AND STATIONS:				
336 7 5	Kew	309 17 0				864 13 1	Kew	1,497 10 11			
602 14 0	Eskdale	514 5 5				891 10 2	Eskdale	731 6 0			
14 7 11	Valencia	8 15 0				246 4 11	Valencia	280 17 6			
—	Farnborough ...	282 16 6				203 4 4	Farnborough ...	304 3 3			
—	Falmouth... ...	3 18 9					Falmouth	65 16 8			
65 9 9	Miscellaneous ...	50 8 10				1,041 8 5	Benson (Net Expenditure)	308 9 4			
			1,170 1 6				Miscellaneous ...	718 6 8			
									3,906 10 4		
	LECTURES AND EXPERIMENTS ...	—	224 7 6			—	LECTURES AND EXPERIMENTS	—	200 0 0		
73 15 0											
	FURNITURE, FITTINGS, &c. ...	—	—			1,695 18 4	BALANCE: Cash at Bank ...	200 16 11			
186 11 6						53 2 7	,, at Office ...	67 16 8			
									268 13 7		
£14,045 3 3			£15,451 2 8			£14,045 3 3			£15,451 2 8		

* For details, see separate statement.

LIABILITIES.						ASSETS.					
£ s. d.			£ s. d.			£ s. d.			£ s. d.		
2,874 8 2	To sundry creditors		2,081 17 10			1,749 0 11	By cash at Bank and at Office ...		268 13 7		
11 2 3	,, salaries reserved		9 8 11			583 10 1	,, M.O. instruments in stock ...		351 15 4		
270 10 0	,, superannuation		—			685 14 2	,, sundry debtors		902 1 5		
482 13 8	,, balance		—			620 8 11	,, Admiralty		175 6 9		
							,, Deficit		393 9 8		
£3,638 14 1			2,091 6 9			£3,638 14 1			2,091 6 9		

NOTES.—(1) On 30th September the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £81 18*s.* 4*d.*

(2) These accounts are subject to audit by the Comptroller and Auditor-General.

Observatories.—Statement of Accounts for the Six months ended 30th September, 1914.

Kew.

1913. Receipts.				1914.		
£	s.	d.		£	s.	d.
309	9	8	Subvention, Scott Antarctic Fund	82	0	0
			Gassiot Trust ...	154	1	6
2	10	0	Expenses refunded locally ...	2	10	0
8	4	9	Tests and Commissions	61	7	6
16	3	0	Cost of books and forms refunded	9	18	0
528	5	8	Balance	1,187	13	11
£864	13	1		£1,497	10	11

1913. Payments.						1914.		
£	s.	d.		£	s.	d.	£	s. d.
706	2	3	Salaries, Scheduled	778	6	6		
			Sunday and holiday duty	11	6	7		
			Extra Assistance	29	8	6		
							819	1 7
31	3	0	Cost of forms, &c.				18	8 5
—			Rent, Rates, Taxes, Repairs and Insurance				449	2 3
40	7	0	Fuel and lighting				40	3 9
12	10	11	Equipment and instruments ...				125	3 9
19	0	4	Consumable stores				5	11 8
54	16	1	Incidental expenses				10	12 3
	13	6	Books, &c.					2 0
—			Postage, telephones and telegrams				28	12 2
—			Travelling expenses					13 1
£864	13	1					£1,497	10 11

Eskdale.

£	s.	d.		£	s.	d.
600	0	0	Subvention, Royal Society ...	500	0	0
2	14	0	Expenses refunded locally ...	14	5	5
288	16	2	Balance	217	0	7
£891	10	2		£731	6	0

£	s.	d.		£	s.	d.
514	13	6	Salaries, Scheduled	507	19	1
30	8	1	Cost of forms, &c.	40	1	1
20	5	2	Rent, Rates, Taxes, Repairs and Insurance	13	18	3
46	11	0	Fuel and lighting	60	15	7
72	9	7	Equipment and instruments ...	18	16	9
—			Consumable stores	22	4	11
12	10	1	Incidental expenses	6	12	7
—			Books, &c.	4	18	4
—			Postages, telephones and telegrams	26	19	4
194	12	9	Travelling and motor car expenses	29	0	1
£891	10	2		£731	6	0

Valencia.

£	s.	d.		£	s.	d.
5	12	11	Subventions, Rosse Fund	—		
8	15	0	Expenses refunded locally ...	8	15	0
231	17	0	Balance	272	2	6
£246	4	11		£280	17	6

£	s.	d.		£	s.	d.
198	12	11	Salaries, Scheduled	221	11	10
			Cost of forms	1	16	6
			Rent, Rates, Taxes, Repairs and Insurance	39	16	10
34	7	0	Fuel and lighting	4	0	0
			Equipment and instruments ...		7	4
13	5	0	Postages, telephones and telegrams	13	5	0
£246	4	11		£280	17	6

Farnborough Branch Office.

£	s.	d.		£	s.	d.
—			Subvention	250	0	0
—			Expenses refunded locally ...	32	16	6
203	4	4	Balance	21	6	9
£203	4	4		£304	3	3

£	s.	d.		£	s.	d.
157	6	4	Salaries, Scheduled	251	0	0
			Rent, Rates, Taxes, Repairs and Insurance		9	9
			Equipment and instruments ...	8	17	11
			Consumable stores	6	17	10
45	18	0	Incidental expenses		5	0
			Books, &c.		14	6
			Postages, telephones and telegrams	29	0	6
			Travelling and motor car expenses	6	17	9
£203	4	4		£304	3	3

Falmouth Weather Station.

£	s.	d.		£	s.	d.
—			Expenses refunded locally ...	3	18	9
—			Balance	61	17	11
—*				£65	16	8

£	s.	d.		£	s.	d.
—			R. Cornwall Poly. Society ...	15	0	0
—			Salaries, Scheduled	30	12	0
—			Overtime, &c.		6	6
—			Rent, Rates, Taxes, Repairs and Insurance...		7	3
—			Equipment and instruments ...	1	4	10
—			Consumable stores		1	3
—			Incidental expenses		13	6
—			Postages, telephones and telegrams	13	4	6
—			Travelling expenses	4	6	10
—*				£65	16	8

* 1913 figures not available.

BENSON.

1913.	Receipts.	1914.	1913.	Payments.	1914.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	By credits for instruments supplied	16 6 0	—	Salaries, Scheduled...	170 7 3
—	Balance carried to Office account	308 9 4	—	Cost of forms, &c.	5 0
			—	Overtime, &c.	4
			—	Equipment and instruments ...	75 8 5
			—	Consumable stores	24 0 8
			—	Incidental expenses	4 5 0
			—	Books, &c.	50 0 0
			—	Postages, telephones and telegrams	5 0
—*		£324 15 4	—*		£324 15 4

METEOROLOGICAL OFFICE, EDINBURGH.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Balance	175 0 0	—	Subvention	175 0 0
—*		£175 0 0	—*		£175 0 0

MISCELLANEOUS STATIONS.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Cost of forms refunded	50 8 10	—	Subventions, Aberdeen, Armagh...	172 5 0
—	Balance	492 17 10		British Rainfall Organisation ...	12 10 0
			—	Salaries of Observers	289 12 8
			—	Overtime	2 6
			—	Rent, Rates, Taxes, Repairs and Insurance	2 11 3
			—	Equipment and instruments ...	10 9
			—	Incidental expenses	55 10 1 0
			—	Books, &c.	1 3 6
			—	Postages, telephones and telegrams	9 0 2
—*		£543 6 8	—*		£543 6 8

* 1913 figures not available.

Submitted—The following statement of the Bank Account in the Cash Book :—

	£	s.	d.
Balance on 23rd June, 1913	2,608	0	6
Receipts from 24th June—27th October	13,392	6	5
	16,000	6	11
Cheques drawn from 24th June—27th October	9,843	18	5
Balance on 27th October	£6,156	8	6

FIFTY-EIGHTH MEETING.

South Kensington, S.W., 25th November, 1914.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	CAPTAIN HARVEY.
THE HYDROGRAPHER.	MR. MIDDLETON.

DR. SCHUSTER.

485. The Minutes (476–484) of the last Meeting (28th October, 1914), previously circulated, were taken as read, and confirmed.

486. CORRESPONDENCE.—**Commissioner of Police** (Minute 478).—Read—the following reply:—

4449/C.11. New Scotland Yard, S.W.,
31st October, 1914.

SIR,

WITH reference to your letter of the 28th instant, respecting the supply of meteorological information to the public, I am directed by the Commissioner of Police of the Metropolis to acquaint you that the suggestion made seems to present some difficulty, as it would not be possible for the police to make enquiry respecting applicants and to transmit the result in time to be of use to the Meteorological Office. In these circumstances, the Commissioner fears it would not be possible for the police to assist in the direction indicated.

I am, &c.,
W. H. KENDALL,
Chief Clerk.

The Director,
Meteorological Office.

War Office.—*Chief Censor.*—Reported—letter 4,571, dated 28th October, from the Portuguese Meteorological Service asking if the daily report from Valencia which had ceased at the outbreak of war could be resumed. On inquiry of the Chief Censor, letter 4,637, dated 16th November, was received, stating that the Director of the Admiralty Air Department is still very much against promulgating any information if it can possibly be avoided.

Little Massingham.—*Sunshine Recorder.*—Read—letter 4,670, dated 18th November, from the Rev. H. L. Brereton stating that at the request of the police he had removed the ball from the sunshine recorder belonging to the Office at Little Massingham, which is a "district value" station. In reply to a letter of inquiry the Chief Constable of Norfolk has promised (4,721/C.11) to take up the matter with the Military Authorities, with a view to getting them to accede to the resumption of the record, as the police see no reason for the recorder to be interfered with.

Royal Meteorological Society.—*Proposed Publication of a Climatological Atlas* (Minutes 425, 481).—Reported—correspondence and an interview with Dr. H. N. Dickson, Acting President of the Royal Meteorological Society, with reference to the publication of the Climatological Atlas, now in preparation on behalf of the Society.

The Director was authorised to consult Wyman & Sons, Ltd., as to the cost of reproduction of the maps and diagrams by lithography.

Reported—letters of thanks from C. E. Heath and others, Royal Exchange Buildings (5,323/13), and from H. R. Witting and Partners, High Holborn (4,175/14), for "valuable assistance."

487. OFFICE AND OBSERVATORY STAFF.—**Enlistments.**—Reported—that permission to enlist had been granted to Messrs. W. J. Tomkins and R. Pyser, and that messenger G. W. Bone had enlisted without asking for permission. Further applications had been received from Messrs. E. L. Ardley, E. L. Clinch, H. T. Smith, and F. W. Creek.

It was agreed that it was not in the public interest for permission to enlist to be granted to Mr. E. L. Ardley, cashier.

Permission may be given to F. W. Creek as soon as satisfactory arrangements can be made.

The Military Authorities state that Mr. Clinch is ineligible on account of his age (17). Mr. Smith is ineligible for the same reason.

Payments to Members of the Staff on Service.—*Private W. J. Tomkins.*—It was agreed that the Office pay the difference between his civil pay and army pay (7*s.* with separation allowance 9*s.*, amounting in all to 16*s.* per week).

Private R. Pyser.—Reported—that Private Pyser is serving in the Army Pay Department, and that his army pay is at the rate of 4*s.* per day.

It was agreed that the army pay be deducted from the civil pay on the scale of a "clerk-computer" without overtime payments.

Superannuation.—*Professional Assistants*—It was agreed that a scheme of endowment assurance to provide superannuation allowances for professional assistants, be prepared and submitted.

New Appointments.—Reported—the appointment of Frederick Charles Warmington, born 27th January, 1898, as boy clerk, on the result of an examination held on 18th November, 1914. The appointment dates from 23rd November, on the usual terms. The wages are provided by deductions from civil pay equal to the army pay in respect of two members of the staff who have joined the forces. (Order 350.)

Also—the appointment of William Robert Penfold, born 3rd November, 1899, as boy messenger, to date from 23rd November, at 7*s.* 6*d.* per week, rising to 10*s.* per week after six months' approved service, to replace G. W. Bone, who has left the Office. (Order 348.)

Approved.

Resignation.—Reported—that Mr. H. Billett, B.Sc., Professional Assistant in the Branch Office at South Farnborough (Minute 413), had accepted an appointment as assistant in the Meteorological Department of the Union of South Africa, and that he had given three months' notice to terminate his agreement with the Meteorological Committee as from Tuesday, 24th February, 1915. (4,737/CB.11.)

The Director was authorised to provide for the vacancy thus created.

488. Observatories.—**Gassiot Committee.**—The Director reported—that a meeting of the Gassiot Committee had been held in the rooms of the Royal Society on 11th November and that draft Estimates for 1915–16 and a Programme of Work for 1915, for the Observatories, had been presented to the meeting.

Valencia.—*New Superintendent* (Minutes 474, 480).—It was agreed that the necessary steps be taken for the appointment of a Superintendent of Valencia Observatory in succession to Mr. Cullum on 1st April, 1915, at a salary of £300 with allowances.

Benson.—*Aerological Observatory* (Minute 480).—It was agreed to include in the Estimates an item of £550 for supplementing the sum provided for the equipment and maintenance of an observatory for the investigation of the upper air at Benson, Oxon.

489. Programme of Work for 1915.—The Programme of Work for the Office, 1915, is indicated in the Programme of Publications printed in Minute 482. A change in practice is contemplated as regards the Weekly Report in that it is proposed to discontinue the computation of the accumulated temperature for the several stations above and below 42° F. One of the objects is that there may be room to give rainfall in millimetres and also the number of days upon which a millimetre of rain has fallen. In view of the absence of a number of members of the staff on service a formal programme of researches is not practicable, but opportunity will be taken as it arises.

The following memorandum on the Programme of Work for the Observatories was laid before a meeting of the Gassiot Committee on 11th November.

METEOROLOGICAL OFFICE OBSERVATORIES.

Programme of Work for 1915–16.

The programme of work is best indicated by the list of publications.

These are to be continued as heretofore, with the exception that it has been proposed to discontinue the publication of the individual hourly readings of the meteorological elements at Kew and Valencia, either for the year 1914–15, or perhaps at the close of 1915. There will then have been a continuous issue of hourly readings for Kew and Valencia for 15 years.

The regular work of the observatories which is not fully represented by publication, is the Seismology which appears only as a monthly table in the *Geophysical Journal.*

The first volume of *Geophysical Memoirs*, to the number of 10, is complete, and a Title-page and Index are being issued.

It is not practicable in present circumstances to make any detailed statement as to occasional researches which can be undertaken at the Observatories.

The structural alterations at Kew, with the accompanying revision of the internal equipment and the re-arrangement of the grounds, are nearly completed.

The most pressing problem is the organisation of the Library, which requires a large sum to be spent on binding; for this, however, there is no present provision.

Endeavour will be made to provide suitably for mechanical assistance at the Observatory. The continuous registration of atmospheric potential is to be re-arranged.

The photo-heliograph installed in the anemometer dome on the initiative of W. De La Rue has hitherto remained unused.

The subvention from the National Antarctic Fund in consideration of a portion of Dr. Chree's time being continued, the employment of an additional professional assistant is also continued.

An important matter with regard to Eskdale Observatory is the ventilation of the Magnet House. It is proposed to deal with the matter through the Office of Works.

A proposal has been mooted for the establishment of a rural post office to be accommodated in the office block of the observatory building, as the Treasury has declined to erect separate cottages for that among other purposes. It would necessitate the employment of an additional boy. If this can be arranged it is hoped that letters may be delivered before the post is collected for the day instead of afterwards.

The Superintendent of Valencia Observatory will have attained the age of 65 years "before the commencement of the new financial year," and as he is rated as a first-class clerk on the office staff, he comes under the provision for the superannuation of Classified Clerks. The Meteorological Committee have sanctioned his retirement on the 31st March next, and they have under consideration, with a view to an application to the Treasury, an improved provision for the work of the Observatory, as shown in the accompanying Estimates.

The following memorandum was presented to the Advisory Committee for Aeronautics on 10th November, 1914 :—

ADVISORY COMMITTEE FOR AERONAUTICS.

Experimental Work in Meteorology.

Meteorological work in connection with aircraft has been gradually developed in the past five years, and the organisation now covers the co-operation of the following units :—

(1) The Central Meteorological Office at South Kensington.
(2) The Branch Office at South Farnborough, proposed by the War Office in 1911, and worked at Pyrton Hill from the time of its nominal establishment on 1st April, 1911, until the completion of the buildings at South Farnborough, in connexion with the Aircraft Factory in December, 1913. The Branch Office is in charge of a Meteorologist appointed by the Meteorological Committee (Mr. J. S. Dines).
(3) The meteorological establishment at the Central Flying School, Upavon, in charge of a Meteorologist appointed by the Army Council (Mr. G. Dobson).
(4) The meteorological establishment of the Kingsnorth Naval Air Station in charge of the Meteorological Officer of the Air Department of the Navy (Captain the Lord Dunboyne, R.N.).

The ordinary routine work of this organisation will be best understood by the list of daily issues of reports &c., from the Central Office in connexion therewith, which is added as an Appendix to this memorandum.

The experimental work for the Advisory Committee under my direction followed on a report on Wind Structure dated 3rd June, 1909, which was published in the Report of the Committee for the year 1909–10. With a grant of £250 for the year 1910–11 and subsequent years, the second, third, and fourth reports on Wind Structure were presented to the Committee, and the papers already in type for 1913–14 include a report on Vertical Motion in the Free Air above Pyrton Hill (Reports and Memoranda, No. 95).

This experimental work was associated with the work of the prospective Farnborough Office, and in the Estimates for 1912–13, £400 was provided on account of the Advisory Committee for those services, but in the Estimates for 1913–14 the £400 was transferred to the Meteorological Office vote and the regular work of the Branch Office began there in January, 1914.

The Reports which have been published represent practically what can be obtained by the means at the disposal of a Meteorologist at a fixed station, and in the programme for 1913–14 it was pointed out that for further progress appeal must be made to apparatus carried on aircraft. I have given a *resumé* of the present position of the investigation in a paper before a joint meeting of the Royal Meteorological Society and the Aeronautical Society of Great Britain on 7th January, 1914. Upon my representation a grant af £250 was made by the Advisory Committee for the prosecution of researches of a novel character, and the collection of information from Pilots that should lead to further advances in the practical study of Wind Structure. Their work was to be carried out at the Branch Office at South Farnborough.

In pursuance of this object, Mr. H Billett, B.Sc., of the Imperial College of Science and Technology, was appointed as Professional Assistant to Mr. J. S. Dines, at South Farnborough, the appointment dating from 1st July, 1913. He was naturally without any training or experience in meteorological work, and as the buildings at Farnborough were not completed until the end of 1913, he worked in the South Kensington Office under my direction upon the Calculus of the Upper Air, which forms the basis of three papers published in the year 1913–14. In October, 1913, he was sent to make a professional report upon the tornado in South Wales. He was engaged upon that work when he was transferred to Farnborough from January, 1914, and spent some time over it there. It is now sent to the printer for publication in Geophysical Memoirs, Vol. II.

The grant of £250 was continued for 1914–15, and the work is still going on, but I am not able to say that any very satisfactory result has so far been produced. There are certain circumstances which account for the absence of material results, but they make the outlook doubtful. In the first place, upon opening the Branch Office a good deal of time had to be spent upon the equipment and arrangement of the Office and the observing station, and the means for placarding the information which was worked up there for the use of aircraft. Even now the anemometer for the Branch Office is not erected, and a progressive investigation of wind structure cannot well be carried on without an anemometer close at hand.

Secondly, the work of the Branch Office is a good deal broken up. It begins at 7 a.m. in order that it may keep itself in touch with the Daily Weather work, and it goes on till 9 p.m. when the evening map and forecast are drawn and issued, and some time is devoted to tabulating anemograms for the Meteorological Office, an occupation which originally begun for the good of the Branch Office, has led to the issue of a weekly summary of anemograph records for the Kingdom, and has become something of a tax upon the staff of the Branch Office, which consists of the Meteorologist, Professional Assistant, and "boy," because it demands prompt attention on certain days. This duty can, however, be otherwise provided for.

But thirdly, and chiefly, the further investigation must be on novel lines and must depend upon the close co-operation of the Meteorologist and the Aviator. The improvements in the machines and in the skill of the pilots have been so great that the state of the weather is no longer a matter of life and death; and the Meteorologist in Charge has become as much convinced as the airman that the questions on the force of the wind which he has developed the means of answering have lost most of their interest, and the questions which the airmen persistently ask, as of fog and one or two other matters, the Meteorologist cannot answer.

The investigations on novel lines have been represented in the periodical reports by various references to the "tetranemograph." They have resulted in a paper which I have not seen, and in the meantime the curiosities of vertical motion in the atmosphere, which ought at least to have been examined, have been unnoticed for lack of apparatus which leads up to work of that kind.

There have been, as a matter of fact, only six months during which the full staff has been available. After the beginning of June there have been a succession of absences on Inspection Duty and holiday, and from the commencement of the War the immediate requirements of the Air Services have been attended to as a primary duty.

In this connection it must be remarked that in the further study of wind structure one cannot improvise an atmosphere, or make a small scale model of it to experiment with. One is largely dependent upon the occurrence of circumstances favourable for investigation, and the intention was to combine the observational experience of the pilots of aeroplanes and airships with the meteorological ideas of the Branch Office. Since the Branch Office was initiated in connexion with the Aircraft Factory, aeroplanes have not only become less dependent on weather, but the Airship Section has been cut off from the Factory. The local meteorologists have not succeeded in bringing themselves effectively into touch either with the Officers of the Section or with the Pilots of aeroplanes.

At Upavon the experience is somewhat similar. The Meteorologist, who has proved himself well fitted for the post and a good comrade, is responsible not only for the meteorological observations and reports, but also for the repair of various instruments carried by aircraft, and the tendency is to make sure of the instruments and take the chance of the weather, so that the Meteorologist has little time for scientific study.

I do not agree that the aeroplane pilot need care nothing about the weather, even if he is able to outride ordinary rough weather. The case is quite on all fours with that of ships at sea; they also have become more or less independent of the wind, but where there is not antagonism there is still rivalry between different ships, and it is not less but more and closer knowledge that is required in order that a vessel shall get the better of its rivals by making more use of fair weather or the best of foul weather.

But the situation requires something more than a discouraged Meteorologist with an inexperienced assistant. It is quite parallel with that which obtains with regard to the Meteorology of the sea. Every sailor is conscious of knowing more about the weather than any landsman, but, on his own account, he never thinks of correcting a barometric reading for temperature or latitude, and consequently his contribution to Meteorology has no meaning for himself. Nothing has in consequence been done for dynamic meteorology by the ordinary system of collecting observations over the sea since the laws of cyclonic storms were established, and they were based upon figures that overpower small corrections.

Nor will any effective progress be made until a Meteorologist can get a ship to be used for the purpose. It is the same with the further study of the air. Every pilot is conscious of knowing more about the atmosphere than the Meteorologist down below, but he does not look at the subject from the Meteorologist's point of view, and so, likewise, the Branch Office at South Farnborough will not make effective progress on novel lines of research until it can employ an aeroplane in its service. This is a much less serious matter than the employment of an ocean going steamer, and I therefore suggest that provision should be made for attaching to the staff of the Branch Office a flying member whose duty it should be to carry out any experimental work required by the Meteorologist.

Appendix.

Summary of the issues of Reports, &c., from the Central and Branch Meteorological Offices at South Kensington and South Farnborough for Naval and Military Air Stations:—

4 a.m.—1st special report (based on 3 a.m. conditions) and forecast for Naval and Military Air Stations by telegraph.

9.30 a.m.—2nd special report (based on 7 a.m. conditions) to Naval and Military Air Stations by telegraph. This report is sent also to the Branch Office at South Farnborough, and is distributed from there to all Naval and Military establishments within reach.

1st cypher map and forecasts prepared for transmission by "wireless" to Naval Air Service.

Advance copy of the 7 a.m. weather map by "Express Letter" to Eastchurch.

12.10 p.m.—Advance copy of lithographed morning report to Kingsnorth.
1.30 p.m. post.—Distribution of Report.
7.15 p.m.—3rd special report (based on 6 p.m. conditions) to Naval and Military Air Stations by telegraph.
2nd cypher map and forecasts prepared for transmission by "wireless."
8 p.m.—Issue of copy of evening map and forecasts, &c., by post to Kingsnorth.
8.30 p.m.—Issue of manuscript map and report at South Farnborough, on information sent by telegraph from the Central Meteorological Office. In peace time this information is sent also to Upavon for the preparation there of an evening map.

Notification is sent by telegraph to all Naval and Military Air Stations, whenever unexpected developments are revealed by observations sent to the Meteorological Office at 1 p.m., or at other hours in response to special instructions.

490. ESTIMATES FOR 1915–1916 (Minute 483).—**British Rainfall Organization** (Minute 481).—Read—letter 4,361 (2) from Dr. Mill stating that it is estimated on the basis of the 1913 volume, that the extra annual cost of producing "British Rainfall" in a larger *format*, in order that annual rainfall totals may be expressed in millimetres as well as in inches, is about £30.

It was agreed that the grant to the British Rainfall Organization for 1915–16 should be provisionally increased from £25 to £55, and that the revised grant be included in the estimates.

Letter forwarding Estimates.—A draft of a letter to the Treasury forwarding the Estimates, which had been circulated beforehand was read. Various amendments were suggested and the Director was requested to incorporate them. The letter as despatched to the Treasury is as follows :—

SIR, 2nd December, 1914.

ON behalf of the Meteorological Committee, I beg leave to forward an estimate of the expenditure of the Meteorological Office in the year 1915–16.

2. The period of five years for which the Chairman and four other members of the Committee were appointed in 1910 comes to an end on the 31st March, 1915. The four members then appointed were Captain J. M. Harvey, nominated by the Board of Trade, Sir George Darwin and Dr. Arthur Schuster, nominated by the Royal Society, and Mr. G. L. Barstow, nominated by Their Lordships. Sir George Darwin died in 1912, and the appointment of Captain Lyons to succeed him covers a period of five years from 26th February, 1913. Captain J. F. Parry, the Hydrographer of the Navy, was appointed to hold office till 16th August, 1919, and in the case of Mr. Middleton, nominated by the Board of Agriculture, the second period of five years from his appointment ends in 1916 (December 2nd).

3. *Consolidation of the Work of the Office in the Five Years*, 1910–15.

The five years now concluding have been marked chiefly by the consolidation and extension of the meteorological and geophysical work within the administration of the Office.

New Premises and Museum.—In 1910 the work of the Office was transferred to new premises at South Kensington, which are held on lease from the Office of Works at an annual rent of £640. With the assistance of private donations to the extent of £300, a museum for the display of meteorological results of general interest has been formed in connexion with the library, out of Office funds, and nearly completed. The Office is, in consequence, now visited by parties from schools and other educational institutions, chiefly on Saturday afternoons. It is generally the subject of favourable comment from visitors, both British and foreign, and the facilities which the Office affords, educationally and otherwise, are much more widely known.

Lithographic Press.—The printing press in the basement, which started in 1911, has been found to be most useful. It has taken up more space than was originally assigned to it, and still needs more, so that there is an encroachment on the available space for office storage, which, combined with the larger requirements of the clerical staff and the increasing volume of documents, is making insistent pressure for more room.

Lecture Room.—The original plan of using the library as a lecture room is becoming more and more inconvenient, and at the same time the usefulness of a lecture room as an auxiliary to the work of the Office has been most clearly shown. It forms the means of educating technically the more intelligent members of the staff.

Kew and Eskdale Observatories.—At the commencement of the period the physical observatories at Kew (Old Deer Park, Richmond) and Eskdalemuir come under the administration of the Office, as part of the scheme put forward five years ago by the Royal Society and the Committee and sanctioned by Their Lordships. In 1913 the testing staff of the National Physical Laboratory was withdrawn from Kew, and the buildings have been altered in order to remedy certain defects and to make them more suitable for their purpose.

Falmouth Observatory.—The observatory at Falmouth, initiated by the Meteorological Committee of the Royal Society in 1868, and maintained by the Royal Cornwall Polytechnic Society since that date with a subvention from this Office of £250 a year, has come under the direct administration of the Committee as a weather station, because the Society was no longer able to maintain it, but was prepared to allow the use of the building, rent free.

Branch Office at South Farnborough.—At the request of the Army Council, an observatory and Branch Office for the assistance of aircraft pilots has been brought into operation in the Royal Aircraft Factory at South Farnborough.

4. *Withdrawal of Subventions.*

Glasgow and Stonyhurst.—Subventions of long standing to Glasgow University and to Stonyhurst College, in aid of the maintenance of meteorological observatories of the Kew type, which also date from 1868, have been withdrawn.

Royal Meteorological Society.—The subventions to the Royal Meteorological Society, paid in consideration of the Society supplying copies of the observations at certain stations for official publication, have also been withdrawn, and all the Society's stations now report directly to the Office, and the observations are available for public use.

5. *Meteorological Office, Edinburgh.*

Scottish Meteorological Society.—The subvention previously paid to the Scottish Meteorological Society on similar grounds has been increased to £350 a year, but the terms have been so modified that the observations at all the stations in connexion with the Society are now available for the public in an office which is recognised as the Meteorological Office, Edinburgh.

6. *British Climatology.*

In consequence of this consolidation, the Monthly Weather Report of the Office now presents a full summary of the climatological observations made by public authorities or private persons in the United Kingdom.

7. *Subventions still remaining.*

The only examples now remaining of subventions to other controlling authorities or their servants in consideration of specific returns, are :

British Rainfall Organization.—£25 to the British Rainfall Organisation for a monthly map of rainfall in the British Isles. It is proposed to increase this in consideration of an important alteration in the Annual Volume of "British Rainfall."

Aberdeen Observatory.—£295 to the Physical Department of the University of Aberdeen for the observatory which is managed by the Professor of Natural Philosophy, but is closely identified with the work of this Office, and is, in fact, the principal establishment of the office for the study of the Meteorology of the North Sea.

Armagh Observatory.—£50 to the Archbishop's observatory at Armagh.

Anemograph and Daily Weather Report Stations.—£670 for 23 telegraphic reporting stations and four separate anemograph stations, which are in the hands of coastguards, lightkeepers, municipal officials or private persons. Part-time service is appropriate in these cases, so that this item will remain, but as both kinds of station belong to the study of the daily weather, the tendency is to include an anemometer with a telegraphic station, and not to make its care a separate undertaking.

8. *Importance of the Consolidation for the Efficiency of the Office.*

The consolidation of the various institutions has brought a considerable increase of the work of the Office and of the expenses incidental thereto. It has, however, enabled the Committee to organise the meteorological work with more definite relation to the objects for which this Office stands. Those objects, speaking broadly, are as follows :—

i. The collection of observations from ships on all oceans, together with the discussion and publication of meteorological results, for the benefit of sailors, and as a contribution to the meteorology of the globe.

ii. The collection and publication of reports received by telegraph, and the issue of forecasts and storm warnings based upon them.

iii. The maintenance of observatories and anemograph stations to furnish material for the scientific study of the phenomena of weather, as exhibited on the daily charts, and the application of the study to the improvement of forecasting, and other purposes.

iv. The organization and maintenance of a trustworthy public memory of the weather, which is available for reference at any time by all classes of the community, and which forms a basis for the study of the Climatology of the United Kingdom in comparison with that of other countries, and in relation to Agriculture, Public Health and other public purposes ; the discussion of the observations with a view to the definition of climatic factors for this country in comparison with others, and ultimately, to the relationships of seasons and the establishment of more general laws of climate and weather, that should lead up to a reasoned forecast of coming seasons.

v. Co-operation with the British Dominions and foreign countries for improving the organization and the instruments by which the purposes enumerated above are to be pursued, and for the effective representation of the meteorology of the globe.

Reference to the Annual Reports of the Committee will show that these purposes have been vigorously pursued. The activity of all divisions of the Office has been well marked, especially in relation to the public services in this country and the dominions.

Board of Trade.—The various inquiries and conferences following the loss of the "Titanic" in 1912 led to many sudden and unforeseen demands upon the Marine Division by the Board of Trade, for charts, information about ice, &c., at short notice, or for more elaborate compilations, and for advice and assistance in organization. All of them have been creditably met or are now being dealt with.

Dominions beyond the Seas.—The Instruments Division has kept the Navy and our own stations supplied with meteorological instruments, and in addition has supervised the whole of the supply of instruments for the new Meteorological Services of the Commonwealth of Australia and of the Union of South Africa. It has also met the requirements of all the Crown Colonies and Rhodesia, and supplied some to Canada, India and various antarctic expeditions. These services are vitally important for the progress of Meteorology, because they keep the meteorological establishments of the different parts of the Empire in touch with one another.

Municipal Authorities.—Through the Statistical Division or the Forecast Division, the Office is in communication, on questions of meteorological organisation, with the representatives of some 175 municipal, educational, or other corporations having local jurisdiction, and 250 private observers.

The Admiralty.—But in the present time of emergency it is the organisation of the Forecast Division which chiefly calls for remark. A number of provisions arranged simply with a view to the efficiency of the Office as a public institution have proved to be indispensable since the outbreak of war, in order to meet the requirements of the Admiralty. All the observatories had been newly organised to take part in the daily weather service and thereby to become cognisant of the problems which they are intended to elucidate, and they have thereby become available for supplying information to the Office at any time, day or night. The other reporting stations had also been so organised in conjunction with the observatories, that the Forecast Division has not failed to meet promptly and efficiently whatever wishes the Admiralty has expressed for information as to the weather over any part of the British Isles and neighbouring seas, for the use of the Navy, the Air Department, or the officials at headquarters. These now extend to eleven separate reports daily, specially prepared for the chief officials of the Admiralty, H.M. Ships and Submarines at various naval stations, and the various Naval Air Stations, beginning with a report for aircraft compiled between 3 a.m. and 4 a.m. and ending with a despatch to the Meteorologist of the Air Department at 8.30 p.m.

From a different point of view also the Committee's provisions for efficiency in peace time have been found indispensable in emergency. The Admiralty expressed the wish that the telegraphic reports should be kept confidential, and yet should be compiled and printed as usual and distributed with a restricted circulation. The lithographic press on the premises, and new telephone arrangements just completed, enabled an effective order to be given to meet this requirement forthwith.

No additional expense has been incurred for special arrangements during the war, except the cost of the additional telegrams, together with £1 a week retaining fee for lodgings in London for a forecaster who is ordinarily stationed at Farnborough, and small sums for two additional telegraphic reporting stations.

The Committee here have pleasure in noting that a call for reports at 3 a.m. has been responded to at the observatories, the stations which are in communication with telegraph, and at the Office, as though it were part of an ordinary day's work.

So far as the Office staff is concerned, the net result up to now has been that what was originally provided for the service of the general public has been found necessary, and has therefore been "commandeered" by the Admiralty for the public service. The work has been carried on without any undue stress upon the staff, but at the sacrifice of certain "appropriations in aid," in consequence of the suspension of the supply of information to the public.

9. *The Cost of the present Work.*

The increase of responsibility which has accrued to the Office with the gradual extension of its work, has been provided for to a large extent by the increase of the Grant in 1913–14 to £20,000, but that sum is found now to be insufficient to maintain the activities of the Office at their present standard to the extent of £1,831.

Of this deficiency, £1,038 comes upon the salary list, and is made up as follows :—

	£
Normal increases	466
Change of grade on completion of probation, and special increases	132
New posts (store-keeper and telephone clerk at M.O., £175 ; mechanic and labourer at Kew, £140 ; professional assistant at Valencia, £125) ...	440

This includes provision for the re-organisation of the staff of the Observatory at Valencia upon the retirement of the Superintendent after nearly 40 years' service there. It also includes an increase of £388 in the expenses of the observatories maintained by the Office, now numbering six. The cost of postage is increased by £80 ; telegrams by £105 ; and Appropriations in Aid (Departmental and Incidental Expenses refunded) are set down as less by £100. The last two items are on account of the war, which has disorganised the regular supply of information to the public. It has also brought a number of additional charges for telegrams upon Office funds in the current year, but they will not all be brought to account until the Post Office accounts come up for payment in the year 1915–16. The Appropriations in Aid derived from payments for services rendered to municipalities and private persons, which, exclusive of subventions and repayment of the cost of instruments, had been raised to the total of £2,119, have been written down by £100 (£51 on balance) for the reasons already given. Recovery will be difficult, and the loss may be greater than is now anticipated.

10. *Valencia Observatory.*

As already stated, the provision indicated includes the reorganisation of the observatory at Valencia, which occupies an important meteorological position on the Atlantic seaboard. It could render much more active service to the study of the daily weather than that provided for in the programme for 1868, which still governs the operations of the observatory.

11. *Further Requirements.*

The following requirements are still unsatisfied :—

i. *Aerological Observatory.*—Adequate provision for a central observatory for the study of the upper air, a requirement which has made itself manifest in recent years, and which needs more than the provisional sum of £450 a year assigned in 1905 and still maintained at that figure.

ii. *Professional Staff for Statistics and Instruments Divisions.*—The strengthening of the professional staff in the Statistical and Instruments Divisions.

So far as can be ascertained, the University of Cambridge in the organisation of the Solar Physics Observatory there, is not making any provision for the study of the Meteorology of the Globe on the lines initiated at South Kensington, and the work therefore falls upon the Office. The necessary provision for this has withdrawn part of the staff from the Statistical Division.

It is these Divisions which in other countries furnish the material of study for University Students in Meteorology as an avenue to a degree. In this country none of the geophysical subjects are represented by professorships in the universities, and our material is on that account not applied as it ought to be. But in this direction some progress has already been made on the initiative of the Office. Formerly, the University of Manchester was quite exceptional in its meteorological work, but now meteorological questions are taken up by the Universities of Wales, Leeds, and Aberdeen, and by the University College of Reading. The University of London has had a Readership since 1906, and by Dr. Schuster's benefaction the University of Cambridge has had a Readership for the past six years.

As a temporary measure an Assistant Superintendent is necessary in the Marine Division.

12. *Terrestrial Magnetism, Seismology, &c.*

The consolidation referred to in paragraph 3 has made the Meteorological Committee responsible for the work of the observatories in other physical subjects besides meteorology. The principal additional subjects are Terrestrial Magnetism, Seismology, and Atmospheric Electricity. Of these subjects, Atmospheric Electricity is likely to become of immediate practical importance through the recording of distant lightning by means of wireless receiving instruments. Terrestrial Magnetism, apart from questions concerning the Mariner's Compass, is at this stage mainly of academic interest in this country; and in the same way, as regards Seismology, so far as this country is concerned, the actual earth movements have more relation to the problems of Geology and Mining than to administrative measures concerning destructive earthquakes; but both are co-operative studies now carried on on an international basis, in which other units of the Empire are very closely interested, and this country ought to be in a position to afford guidance in the methods of observing and in the interpretation of the results. It is also to be remarked that the problems which present themselves for solution in magnetic and seismological observatories certainly require the co-operation of a meteorological observatory, and the co-ordination of all three studies in one locality, even if they are not concentrated under the same roof, is of great advantage.

When they are combined in one observatory the organisation ought to be sufficiently ample to allow each study to proceed with some degree of independence, so that each observatory requires a three-fold staff. The staffs of the two principal observatories of the Meteorological Office are not large enough for this division of labour to be properly marked out, and to bring them up to the required scale three additional professional assistants and two additional clerical and technical assistants are required.

Eskdale Observatory.—At Eskdalemuir there is a difficulty about housing in the vicinity which has not yet been overcome, but it deserves attention because the incidental difficulties of maintaining an institution at so remote a spot become less formidable the larger the institution.

13. *Summary of Additional Requirements.*

Thus the additional requirements which the Meteorological Committee ought to be able to satisfy are:—

	£
§11.—i. Provision for a central observatory for the study of the Upper Air ...	550
ii. The strengthening of the professional staff of the Marine, Statistics, and Instruments Divisions	550
§12.—iii. Additional staff for the two principal observatories	500

No provision is here taken with regard to the Superannuation Fund, which has been referred to in previous correspondence. The annual contribution for the provision of superannuation allowances for the staff was assessed by the Meteorological Council in 1900 at £750, and though the payment has not always been made in full, the fund has provided the allowances so far required for retirements. It has probably been economical for the Office, as none of the annuities payable by the National Debt Commissioners has yet fallen in. The accumulation is, however, now practically exhausted, and future superannuation payments must fall on the current income of the fund. Having regard to the increase in the number sharing the advantage of the fund, the allocation for that purpose should be increased. Allowing £169 for this, inclusive of various small items which have been noted, the total increase of the Grant required is £3,700. If it were set at £25,000 for the coming period, inclusive of the Grant of £1,000 now made to the Royal Society for Eskdalemuir, provision would be made for the needs of the service.

14. In communicating their decision upon the Grant for 1913–14, Their Lordships suggested that the increase should not be immediately devoted to recurring expenditure. The Committee are under no misapprehension as to the advantage of having an accumulation upon which to draw in emergency, or which can be used for special purposes not necessarily the same from year to year, but Their Lordships will recognise that on the occasion in question the Grant fell short by about £1,000 of the sum which the Committee had set down in their estimate as necessary for carrying on the work, and they had therefore to decide in what direction expenditure could be restricted in order to bring it within the limits of the income. The difficulty was to meet pressing demands, and their estimate allowed no margin for accumulations beyond that arising from the postponement of work.

15. The Committee regret that these matters should have to come up for consideration at a time without precedent like the present, but they have every reason for regarding with satisfaction the manner in which the Office has been able to respond to the unprecedented demands made upon it in the national crisis. They wish to submit the consideration that the purposes for which the Office stands have got past the preliminary stage of tentative expenditure. There are now material and experience enough in the Office to make the work of the Office of great practical utility if it is efficiently done. To postpone the use of it until the country has recovered its prosperity would be to postpone it until its use is no longer required.

I am, &c.,
W. N. SHAW.

The Secretary, H.M. Treasury,
Whitehall, London, S.W.

METEOROLOGICAL OFFICE. ESTIMATES for the Year 1915–16.

—	Proposed, 1915–16.		Voted 1914–15.	Increase.	Decrease.
	£	£	£	£	£
Director		1,000	1,000	—	—
Salaries :					
Office (including Farnborough)		10,508	9,944	564	—
Observatories		3,872	3,398	474	—
Expenses of Office :					
Rent, heating, and lighting		700	700	—	—
Furniture and equipment	100				
Library	50				
Insurances and repairs	100				
Incidental expenses and consumable stores	190				
Stationery Office (S.O.P.)	60				
Post Office charges :		500	450	50	—
Postage		750	670	80	—
Telephones		78	78	—	—
Telegrams		2,895	2,790	105	—
Travelling expenses		400	380	20	—
Superannuation allowances :					
Annuities		1,012	1,012	—	—
Pensions not chargeable on Fund		425	425	—	—
„ chargeable on Fund		275	209	66	—
Contribution to Fund		475	541	—	66
Cost of instruments		2,350	2,650	—	300
Expenses of M.O. Observatories :					
Subventions	30				
Rent, rates, taxes, repairs, and insurance ...	189				
Fuel and lighting	222				
Equipment and instruments	510				
		951	533	418	—
Cost of forms	110				
Consumable stores	162				
Books, &c.	55				
Incidental expenses	133				
Postage, telegrams, and telephones	151				
		611	708	—	97
Travelling and motor car expenses		117	50	67	—
Grants to auxiliary observatories, anemograph stations, &c.		1,780	1,756	24	—
Grant for salaries, &c. of Edinburgh Office ...		350	350	—	—
		29,049	27,644	1,405	—
APPROPRIATIONS IN AID.					
Subventions for observatories :					
Advisory Committee for aeronautics ...		250	250	—	—
Royal Society		1,462	1,462	—	—
War Office		65	65	—	—
Expenses refunded :					
M.O. observatories		238	209	29	—
Auxiliary observatories and stations ...		111	111	—	—
M.O. departmental		330	490	—	160
M.O. incidental		585 }	575	60	—
Stationery Office account		50 }			
M.O. telegraphic expenses		615	615	—	—
M.O. telephone charges		50	50	—	—
Inspections		200	180	20	—
Instruments (Royal Navy)		900	700	200	—
„ (other sources)		1,000	1,500	—	500
Superannuation annuities		1,012	1,012	—	—
Lectures and experiments		350	425	—	75
		7,218	7,644	—	426
Present Parliamentary Grant in Aid		20,000	20,000	—	—
		27,218	27,644	—	—
Unprovided for 1915–16		1,831	—	—	—
		29,049	27,644	—	—

Further sum required for 1915–16 and succeeding years	£2,169
Making the Grants in Aid to the Meteorological Committee	24,000
To the Royal Society, for Eskdalemuir	1,000
In all	£25,000

Meteorological Office,
2nd December, 1914.

W. N. SHAW.

491. DIRECTOR'S REPORT AND ACCOUNTS :—

Reports of Work.—0. *Library, Réseau Mondial and Technical Inquiries* (October).—Library.—Current work. 29 authors' cards and 8 cross reference cards prepared. 88 books borrowed by Office staff. 11 volumes of British Meteorological and Magnetic Year Book, 1912, Parts 3 and 4 received from binders, examined, and distributed. Alteration of shelf marks in catalogue, authors' cards and subject cards for books in Bay IV., lower tier, completed.

Number of publications received.—412.

Inquiries.—Personal, 29 ; letter, 33.

Receipts for inquiries.—£3 0*s.* 4*d.*

Miscellaneous.—Part preparation of meteorological data for African Pilot, Part II., for the Admiralty. List of foreign and colonial stations for Circular 001 revised to end of September, 1914.

Réseau Mondial.—Tables prepared and checked as far as possible for zones 1 to 4 for 1911.

Foreign and Colonial Returns.—131 manuscript returns received from Foreign and Colonial Stations.

Inquiry Assistants.—Miss Smith.—Examining proof of Observer's Handbook and charts for Appendix IV. to Weekly Weather Report. Translating and summarizing parts of Drygalski's "Greenland Expedition" for Captain Hepworth. Preparation of data for East African Pilot, Part II. Copying data for Malden Island for 1913–14. Preparation of Calendar for 1915.

Miss Turney.—Completing diagram of temperature at Greenwich. Extracting record of highest hourly wind velocity from tabulations for Valencia, Falmouth, Aberdeen, and Kew, for 1868–1914. Preparation of lantern slides, Roll Calendar for November, and litho transfers for Monthly Weather Report for September.

Publications.—Report for October, 1914, from Clerk of Publications :—

—	Received.	Issued.
Daily Weather Report	860	104*
Weekly Weather Report	375	318*
Monthly Weather Report	600	479*
Do. do. (Maps)	25	2
Daily Readings	75 (July and August)	52 (July), 52 (August)*
Geophysical Journal, 1913	150 (Sept. and Oct.)	122 (Sept.), 125 (Oct.)*
Hourly Values—Meteorological, 1913.—Kew ...	300 (August)	12 (August)
Eskdale ...	300 „	12 „
Valencia ...	300 (September)	12 „
Monthly Meteorological Charts (Atlantic)	600 monthly to Nov. (3)	414*
(Indian)	350 (Nov. and Dec.)	252*
International Upper Air Observations, 1912 ...	—	—
Ninth Annual Report...	—	1
Observer's Handbook (1913)	—	2
"Forecasting Weather"	—	—
Cloud Atlas	—	—
Calendar, 1914	—	—
Structure of the Atmosphere	—	—
Seaman's Handbook	—	9
Report on Work of S.S. "Scotia"	—	1
Geophysical Memoirs, No. 1	—	—
No. 2	—	—
No. 3	—	—
No. 4	—	—
No. 5	—	2
No. 6	—	1
No. 7	—	—
No. 8	—	1
No. 9	—	—
No. 10...	—	15

* Issue restricted on account of War conditions.

Receipts from sales at M.O.—19*s.* 5*d.*

New Publications.—No new publications were received and no general issue was made during the month. The Calendar for 1915 and Circular 001 are nearly ready for printing. A prospectus of the first volume of Geophysical Memoirs, now nearing completion, is in the press.

M.O. Press (October).—The printing of the undermentioned publications has been as contract :—

Daily Weather Report.
Maps for the Monthly Weather Report.
Monthly Meteorological Charts of the North Atlantic Ocean.
„ „ „ Indian Ocean.

Other requisitions on hand at the beginning of the month	5
Requisitions issued during the month	5
Total	10
Requisitions discharged during the month	4
Requisitions on hand at the end of the month	6

The maps of the Weekly Weather Report are not being printed at present. They will be issued as soon as the necessary data are received.

1. *Marine Division* (October).—Logs and Registers.—Dealt with on receipt 11 Meteorological Logs, and 1 Abbreviated Log; also 65 North Atlantic Registers, 14 Radio-telegraphy Registers, and 7 Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic. The issue for November, 1914, published; the issue for December, 1914, in course of preparation.

Monthly Meteorological Charts of the Indian Ocean.—Issue for December, 1914, published.

Extracting and Tabulating Data for Load Line Committee relative to Gales in the North Atlantic. —Completed 1911–1912 and 1910–1911. Extracted data for about one other year.

Drawing isobars in millibars, on South Atlantic Charts in lieu of isobars in inches.

Corrections for Barometers obtained in connexion with—

(1) Reports by Radio-telegraphy, 9.
(2) North Atlantic Registers, 5.

Observational Duties.—Time occupied 9 hours.

Extraction and tabulation of recent 6 p.m. G.M.T. observations for all oceans.

Indexing in ocean 10° squares.

Notices of ice sent to "Shipping Gazette" on 9 days.

„ „ Lloyd's List on 10 days.

Extraction of observations recorded in selected areas for the Indian Government. Time occupied, 8 hours.

2. *Forecast Division* (Central Office, October).—(1) New Working Charts of slightly increased size showing Spitzbergen in its proper position and making provision for plotting marine observations from the western Atlantic were taken into use on 1st October.

(2) Issue of current information.—The normal routine of the division has been much disturbed. At the end of September by Director's instruction the issue of information to the press was restricted to the usual forecasts (Form 216) without the "General Inference," and the figures from health resorts (Form 202) without the observations of pressure and wind at 6 p.m. The Daily Weather Report was issued to the public by the evening post.

From 15th October the issue of information was further curtailed, as the result of correspondence with the Admiralty. The issue to the press was restricted to Forms 216 and 202, with the further modification that forecasts of wind were omitted from Form 216. The issue of the Daily Weather Report to the public was entirely suspended. The report is still prepared day by day, and circulated day by day to Government Departments, as a confidential document. The report is being circulated to the general public a fortnight after date. Subscribers have been given the option of receiving Form 202 and 216 day by day in lieu of the report, their files being completed after a fortnight has expired, or of carrying over their subscriptions until the normal issue is resumed. 117 regular recipients of the report have applied for Forms 202, 216. 110 have asked for their subscriptions to be held over. The majority of recipients have expressed no wishes in the matter and their files are being completed as the reports are released.

(3) The preparation of the maps for the Weekly Weather Report has been suspended, but the working charts are being completed as far as possible from the Daily Weather Reports of foreign countries and observations over the Atlantic received by post. Reasonably complete information for the European area and the Atlantic Ocean is thus available on the working charts about three weeks after date. The publication of the maps of the Weekly Weather Report is being delayed until the Siberian information becomes available. This has been promised by the Russian Office.

(4) The remarks on the weather have been prepared as usual for the Weekly and Monthly Weather Reports. Owing to the current information being regarded as confidential, certain of the statistical tables usually prepared by Division 3 from the returns from telegraphic stations have been prepared by the forecast division.

(5) The publication of synoptic charts on the North Atlantic Charts was discontinued from 15th October.

(6) Supply of Forecasts to the Services.—The usual forecast telegrams have been sent to various units of the military and naval wings of the Royal Flying Corps, the addresses being varied from time to time in accordance with instructions received.

In addition the special 3 a.m. service has been maintained, and since 27th October these reports have been sent to all flying stations.

By instruction from the Admiralty the messages usually prepared for transmission by wireless to ships in home waters have been sent by telegram to various addresses (18 in all) specified by the Admiralty. Arrangements have been made with the Post Office to distribute the messages as a classified service.

At the request of the Admiralty telegraphic forecasts have been sent twice a day to the Commodore of the Submarine Branch, Harwich.

Advance copies of the Daily Weather Report have been sent daily to the Admiralty, to the Commodore at Harwich, and to the Naval Airship station at Hoo.

The cypher of the chart and forecasts have been prepared each day as usual for the naval airship department.

(7) Number of wireless reports received from

(1) H.M. Ships, none.
(2) Mercantile Marine, 15.

No. of wireless reports received in time for inclusion in Daily Weather Report on 7 a.m. map, 2.
Do. do. on 7 a.m. or 6 p.m. map of "yesterday," 15.

(8) Corrections and additions to Daily Weather Report for British and French stations have been issued for the month of August. The additions for Scandinavia and Germany are to be published later.

(9) Wind frequency results extracted to middle of September.

(10) Working charts prepared for binding up to end of July.

(11) Checking of 8.30 p.m. forecasts completed up to end of March and also June.

(12) Storm warning checking completed—

Anemometer results to end of July.
English lighthouses to end of September.
English lightships to middle of October.
Scottish lighthouses to end of August.
Irish lighthouses to end of August.

(13) Inquiries :—

Prepaid replies	2
Other telegraphic inquiries	2
Telephone inquiries	12

Replies to inquiries from the public are restricted to extracts from the last issue of Forms 202 or 216.

(14) Assistance to Division 3.—Preparation of Appendix III. of the Weekly Weather Report commenced, and the general work of the Branch.

(15) Staff.—Mr. Goldie returned from Falmouth for a spell of duty at M.O. on 8th October.

Mr. Brodie was transferred for temporary duty (four weeks) at Falmouth on 9th October.

Permission has been given to Mr. Pyser to enlist. The division has also lost the services of Mr. Bradnock for this cause.

The 3 a.m. service has been carried on by Mr. J. S. Dines and the Superintendent.

(Branch Office at Farnborough, October).—The regular telegraphic and forecasting work has been carried on as usual. Information has been distributed to Arnold House and to the Headquarters, Royal Flying Corps. as previously, but the public exhibition of weather charts and forecasts has been suspended from the 16th of the month. The exhibition of autographic records showing local weather has been continued.

Mr. Dines has attended at the Meteorological Office, London for 15 nights, for the early morning forecast work.

13 single theodolite pilot balloon ascents have been made during the month.

One of the self-recording theodolites has been taken to pieces, cleaned and repaired.

The calculation of upper air temperature distributions from pilot balloon ascents has been brought up to date, all the past ascents having now been dealt with.

Details of the wind and weather conditions associated with German aircraft raids have been collected and supplied in response to a request from Mr. G. I. Taylor.

Mr. Dines has devoted some time to the London rainfall data, previously worked out, in order to complete the figures for publication.

The necessary particulars have been calculated for the ruling of a boxwood scale for the measurement of gradient wind velocities.

Mr. A. H. R. Goldie has checked a further six months of the South Farnborough forecasts, so that the checking is now complete for the nine months, January to September, 1914.

The regular analysis work has been continued.

During the month a telephone has been installed in the Branch Office.

(Falmouth Observatory, October).—Routine Work.—Monthly Return (Form 355) (two copies).—Completed and checked for September ; completed for October up to morning of 31st.

Tabulation of :—

Barograms (Form 539).—Comparison made between standard readings and the records of Dine's Float Barograph.

Hourly Values of Rainfall (Form 410)
Hourly Values of Sunshine (Form 403)
Falmouth Robinson Anemograms (Form 401)
} Completed and checked for September ; completed for October up to morning of 31st ; values nearly all checked.

Scilly Robinson Anemograms (Form 401) completed for September ; completed for October up to 25th.

Falmouth Record of Wind Direction (Form 224)
Scilly Record of Wind Direction (Form 224)
} Completed for September.

Plymouth Pressure Tube Anemograms (Form 430) completed up to 25th October.

Analysis of :—

Pendennis Pressure Tube Anemograms (Form 339)
Scilly Pressure Tube Anemograms (Form 339)
Plymouth Pressure Tube Anemograms (Form 339)
} Completed up to 24th October.

No pilot ballon ascents.

Monthly Reports supplied to the Cornwall County Council and to the British Rainfall Organization.

In accordance with Instructions contained in the Director's Circular Letter of 24th October, the supply of *daily* and *weekly reports* to the Press was discontinued after that date.

Mr. Goldie's services were transferred to the Meteorological Office on 8th October.

Mr. Brodie assumed temporary charge of the Observatory on the evening of 10th October.

3. *Statistical Division* (October).—British Meteorological and Magnetic Year Book.—(1) Weekly Weather Report.—Current issues (Nos. 39 to 42), except the charts, which will be issued as soon as the necessary data have been received.

Copy for Quarterly Summary of Weekly Weather Report sent to printer.

(2) Monthly Weather Report.—September, 1914, issued.

(3) (i) Daily Readings.—July and August, 1914, issued.

(ii) Geophysical Journal.—September and October, 1913, issued. Usual quarterly information supplied for English and Irish Registrars-General. The latter has decided to discontinue for the present the publication of meteorological information.

(4) Hourly Readings, 1913.—Valencia : September issued ; October signed for Press ; copy for November in hand.

Kew : August issued ; September proof corrected ; October copy with printer ; November copy in hand.

Eskdalemuir : August and September issued ; October copy in hand.

Aberdeen : Hourly means for July to September prepared.

Anemograms.—Pressure-tube anemograms from fifteen stations analysed and from four stations tabulated up to 24th October. In addition to these, four stations were analysed at South Farnborough and three at Falmouth. The Eskdalemuir records were analysed and tabulated at the Observatory.

Robinson cup anemograms from five stations were tabulated up to 26th October. In addition to these, the records from two stations were tabulated at Falmouth.

Sunshine Cards.—The cards from 76 stations, for September, were examined and returned with a comparison of the estimated duration of sunshine made by the observer with that made in the Office.

The cards from 124 stations were examined and filed in the Office, a comparison of the observer's and the Meteorological Office's estimate of duration having been made on a selection of cards from 24 stations and sent to the observers concerned.

Aneroidograms.—Form 531 from 30 stations and Form 533 from 15 stations, filed up to date.

Thermograms.—Form 542 from one station, Forms 547 and 548 from six stations and Form 549 from one station, filed up to date.

Miscellaneous.—Rain curves and hyetograms from seven stations, microbarograms from two stations, radiograms from one station and hygrograms from three stations, filed up to date.

Rainfall returns from 84 stations entered on Summary Sheet (Form 372).

The Fleetwood and Holyhead anemograph tabulations for September were copied and sent to the usual recipients.

4. *Instruments Division* (October).—Barographs were issued to Sheerness (2) and Portsmouth. Four dockyard returns for the September quarter received at the end of the month.

Supplies of Instruments were sent to the agents at Dundee, Cardiff, Glasgow, Liverpool, and South Shields, and also to two ships. The Skulmartin Lightship was supplied with thermometers.

One storm-warning cone was sent to the Irish Lights Office. Two were supplied for use on the rifle range at Longmoor Camp.

The rain-gauge glasses with the code on them (*see* page 451) have been issued to 19 telegraphic stations.

Instruments were supplied on repayment to five observers at home stations, and consignments were sent out on four colonial requisitions. These include 48 barometers for the Commonwealth which are packed in sand so as to minimise the risk of breakage.

Specially printed sunshine cards procured for the Netherlands Meteorological Service were despatched.

Staff.—Mr. Ockenden has been attached to this Division since October 26th in place of Miss Wigley.

Observatories—Kew (October).—The barograph, thermograph, and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	4
	Horizontal Force	5
	Inclination	4
Potential Gradient		on 18 days.
Wilson Apparatus		„ 19 „
Ebert „		„ 19 „
Pyrheliometer		„ 10 „

International cloud observations were made on three days.

A scale value determination was made of the electrograph.

A number of special observations of declination and horizontal force have been taken with the Cooke Unifilar Magnetometer, No. 26, in accordance with the promise made to the United States Coast and Geodetic Survey.

One solar maximum thermometer, which has been under observation for some time on behalf of the National Physical Laboratory, has had its test completed, the results being communicated to the Laboratory.

Photographic paper has been sent to Oxford.

The 4-foot earth thermometer M.O. 6,481 was accidentally dropped and broken on 18th October, and was replaced by M.O. 62, which has been read daily since the 19th. No apparent discontinuity was produced in the records.

Mr. Nichols has returned to the Observatory from Eskdalemuir.

Mr. Stewart and Mr. Boxall have been absent on leave for a few days.

Eskdale (October).—Staff.—There has been little leave of absence. James Graham, of the Cote, is temporarily at work as a boy-clerk.

Underground Magnet House.—The oil lamps have been kept burning under the exit shafts. The temperature in the east room is to-day (28th October), 13·1° C., which is 1·6° C. higher than on same date last year.

The amount of water mopped up from the trench in October has been 15 litres. It collects mostly in the N.W. corner; the concrete floor there appears to sweat moisture but no water collected in a hole 3 inches deep drilled in it, thus showing that moisture is *not* oozing up from below.

The 50 kg. of calcium chloride put in on 17th September has partially liquefied, accounting for perhaps a further 10 litres of water. The liquefaction has occurred most rapidly in the porch, most slowly in the west room. Nevertheless, parts of the west room near the opening to the passage in N.W. corner are actually wet. It should be noted in this connection that the water produced by the four acetylene jets which light the east room, amounts to about 15 litres per month.

The statement that "condensation had ceased" in the September report referred to the entrance porch. It is possible that condensation may have continued in October on the outer stone wall behind the lath and plaster. The air can reach this through the holes which have recently been cut in the plaster, and the condensed moisture would flow down into the trench.

The underground house was inspected on 2nd October by Mr. Ryle and three other gentlemen from the Office of Works. The brown growth referred to in the September report has been submitted by them to botanical experts.

Mr. Ryle and the Superintendent measured the air leaving by the north cowl: 120 cubic metres/hour, and entering by the three ducts: + 24, + 12, — 12 cubic metres/hour. These quantities do not balance, so they arrived at the conclusion that most of the air passing through the building had entered by the porch. Some verification on other occasions would be advisable. The wind at the time was 3 metres/second from S.W.

Other Buildings and Grounds.—The huts are being painted white inside and the guest rooms distempered. The sewage plant has been overhauled by H.M. Office of Works.

Magnetics.—Hourly values for 1913 have been despatched to the Office as follows:—

All N. and W. values; V. values, August—December. Some of the previous months are to follow.

The inequalities, monthly means, Fourier coefficients, and descriptive notes for 1913 are in progress.

The tabulations of the current year are in the following state:—

——	N.	W.	V.
Read once	To date	September	To date
Read twice	August	July	August
Individual bases	May	May	April
Smooth bases	March	March	—

For testing magnets, pocket knives, boots and the like, an instrument has been arranged which reads direct in gamma or in C.G.S. units of magnetic moment.

The usual observations have been continued.

Meteorology.—The work has proceeded as usual. The arrangements for heating the rain-gauge and wetting the thermograph bulb are ready for trial.

One of the strips of the pyrheliometer was accidentally overheated by the observer. In re-adjusting it he detached the other strip. Both are now in working order again.

Atmospheric Electricity.—Observations of ionization are being continued on fine afternoons between 14h. and 16h. The annual tabulations for 1913 are nearly ready. The curves have been read up to the present month.

Seismology.—The Omori is running again. The tabulations remain in the same state as last month.

The Motor Car is under repairs, having had two wheels damaged in an accident. A claim for damage has been put forward to the Insurance Company and has been acknowledged by them.

Accounts.—Submitted—The following statement of the Bank account in the cash book :—

	£	s.	d.
Balance on 27th October, 1914	6,156	8	6
Receipts from 28th October to 24th November, 1914	65	12	11
	6,222	1	5
Cheques drawn from 28th October to 24th November, 1914	1,995	14	5
Balance on 24th November, 1914	£4,226	7	0

FIFTY-NINTH MEETING.

South Kensington, S.W., 27th January, 1915.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

THE HYDROGRAPHER.	MR. MIDDLETON.
CAPTAIN LYONS.	DR. SCHUSTER.

492. The Minutes (485–491) of the last meeting (25th November, 1914), previously circulated, were taken as read and confirmed.

493. CORRESPONDENCE.—**Foreign Office.**—Reported—the following reply to the request of the French Ambassador, transmitted through the Foreign Office, as printed in Minute 449 :—

SIR, 22nd December, 1914.

IN compliance with the request contained in Sir W. Langley's communication of 2nd February, 1914, No. 4,771, addressed to the Secretary of the Board of Agriculture, I beg leave to forward the enclosed memorandum on the organisation of the Meteorological Office in London, with special reference to Agricultural Meteorology.

I am, &c.,
W. N. SHAW.

The Under-Secretary of State,
Foreign Office,
London, S.W.

MEMORANDUM on the ORGANISATION of the METEOROLOGICAL OFFICE, in LONDON, with special reference to AGRICULTURAL METEOROLOGY.

Drawn up by the Director of the Meteorological Office at the request of the Foreign Office, dated 2nd February, 1914, for the use of the French Ambassador.

His Excellency asked to be informed of the "*textes legislatifs et administratifs* qui réglementent les services de météorologie générale et plus particulièrement de météorologie agricole en Grande Bretagne."

Textes legislatifs.—The only legislative authority for the Meteorological Services of this country in any year is the appropriation by Parliament of a sum as a "Grant-in-Aid" for the "Meteorological Office" in the Appropriation Act of that year.

A "Grant-in-Aid" is a fixed sum handed over by H.M. Treasury to be administered, under conditions laid down by the Treasury, by some body of persons, whether constituted expressly for that purpose or not, who become responsible for the expenditure, and for any administrative action taken in conformity with the prescribed conditions.

The Ministers responsible to Parliament for the grant, the Lords of the Treasury, accept no responsibility for the actions of the administrative body, provided they are within the prescribed conditions.

The grant for the expenses of the Meterological Office was fixed at £20,000 in the year 1913. It is included in the Votes for Scientific Investigation, and is made to the Meteorological Committee, a body constituted by a Minute of the Treasury.

By custom, the Committee which administers a "Grant-in-Aid" is allowed to undertake the administration of other grants, and also to receive payment for special duties undertaken for or services rendered to private persons, public bodies, or, in certain cases, to Departments of Government.

It is not entitled to the official services of the Post Office or other Departments of State, but by special arrangement the Meteorological Office enjoys certain official facilities with regard to the priority of meteorological telegrams and with regard to stationery and printing.

The total expenditure on the various services in the administration of the Meteorological Committee is about £30,000 a year. It must, however, be pointed out that the meteorological observations available at the Office include those which are carried on primarily for their own purposes and at their own expense, by municipal corporations and private persons. With regard to these, the Office acts only as adviser, organiser, compiler and publisher of results. This voluntary work—taking observations of rainfall also into account—probably represents an expenditure of £20,000, making the whole expenditure on meteorological services in this country, including municipal and private enterprise, about £50,000, of which £21,000 is provided by Government.

Textes administratifs.—The only *textes administratifs* for the Meteorological Services are the Minute of the Lords Commissioners of H.M. Treasury, dated 20th May, 1905, constituting a Director of the Meteorological Office and a Meteorological Committee with the Director as Chairman, and subsequent Treasury Minutes re-constituting the Committee or appointing members thereof.

A copy of Treasury Minute of 20th May, 1905, is appended.

In accordance with regulation, accounts of the receipts and expenditure of the Office for each year are audited by the Comptroller and Auditor-General and reported to Parliament; and a Report upon the work of the Office is presented each year to the Treasury and laid before Parliament by Command of His Majesty.

Any Member of Parliament is, therefore, at liberty to raise any question upon the accounts or the report, but otherwise, with the limitations herein indicated, the Director and Committee have full discretion as to the objects to which the funds shall be devoted and the means which shall be adopted for securing them.

The practice of the Office is guided by tradition, which has been formed in the past 60 years. The Grant-in Aid has been increased from time to time for reasons urged either by the controlling authority or by parliamentary critics of the Office. Each increase has carried with it the intention to accomplish some specific object, and, therefore, a tacit obligation on the part of the controlling authority: but the Treasury has never made conditions about details of expenditure, and has always accepted the statement of the proposed allocation of the grant without comment; so that the Committee is not bound by any conditions, but merely guided by its own judgment in accordance with tradition and practice.

It is important to note this in the consideration of the special application of Meteorology to Agriculture. That is one of the objects of the Office, but any other of the applications of Meteorology in the interest of the public is equally so. There is no special allocation of funds for the application of Meteorology to Agriculture as such.

The operations of the Meteorological Office being guided so largely by tradition and practice, without any *textes administratifs*, which prescribe its duties and operations in detail, the only means of obtaining a conspectus of the guiding principles of its organisation is by reference to the Annual Reports which have been issued since 1868, to occasional reports before that date and to the reports of certain Committees of Inquiry, from which the present organisation has grown. It now comprises a Central Office with four technical divisions, two branch offices, six meteorological observatories, about thirty subsidised stations and upwards of three-hundred voluntary stations. Terrestrial Magnetism and Seismology are associated with Meteorology. The reports are, however, so voluminous that a brief historical retrospect may be acceptable, and is therefore given here. It is necessary to go into some detail because the subject ultimately under consideration is the application of Meteorology to Agriculture, and in such a case application means that the agriculturist must be in a position to receive and use the information which the meteorologist has to give, and this requires much preliminary work, first, to put the meteorologist in possession of the necessary facts and principles, and secondly, to enable the agriculturist to understand the technical language and ideas without which communication is meaningless.

Marine Meteorology.

1. The Office was started in 1854 as the Meteorological Department of the Board of Trade, under Admiral R. FitzRoy, on the recommendation of an International Maritime Conference held at Brussels in 1853. The sole purpose of the department was the supply of meteorological instruments to the navy and mercantile marine, and the collection and discussion of meteorological observations from ships.

Those duties still remain in much the same form. They are undertaken partly by the Instruments Division and partly by the Marine Division of the Office.

Daily Weather Study.—Telegraphic Reporting and Anemograph Stations.

2. Moved especially by the loss of the "Royal Charter," in 1860 Admiral FitzRoy in co-operation with Le Verrier, and with the support of the Prince Consort, began daily telegraphic reports from stations in this country, and subsequently from France. With the aid of charts prepared from the observations, he commenced the issue of "forecasts" and "storm-warnings." This was the first beginning of what is now the Forecast Division of the Office. The procedure was sharply criticised by the scientific authorities of the time, and upon FitzRoy's untimely death in 1865 the Board of Trade took the matter up with the Royal Society. Upon the report of an inter-departmental committee (Board of Trade and Admiralty) a new departure was taken, viz.:—

Observatories of the First Order.

3. In 1867 a grant-in-aid of £10,000 was assigned to a Meteorological Committee (unpaid) to be appointed by the Royal Society, with enlarged duties, viz.:—

(*a*) To continue the work in marine meteorology of the Meteorological Department of the Board of Trade.

(*b*) To continue the study of weather by means of daily telegraphic reports, but not to issue forecasts or storm-warnings. (The storm-warnings were replaced by request of the Board of Trade, but the forecasts remained in abeyance till 1879.)

(*c*) To bring to the assistance of the study of weather, the records obtained from self-recording instruments at seven special observatories on land established for the purpose. (This marks the introduction of observatories into the Meteorological Office system which are now represented by five meteorological observatories, two of which include magnetism and seismology, and a central observatory for the study of the upper air.)

Climatology and the Meteorology of the Globe.

4. In 1872 an International Conference of Meteorologists was held at Leipzig, which was followed by official international congresses of duly accredited representatives at Vienna in 1874 and ultimately at Rome in 1879. These international meetings concerned themselves partly with the exchange of information by telegraph between countries in Europe, and also with the study of climate, which is primarily of local or national importance, but ultimately has to do with the meteorology of the globe.

Exchange of Publications.

They also led to the organisation of an elaborate exchange of publications, so that a meteorological office has become the most comopolitan of all institutions and is in direct communication with every civilised country.

The international meetings not only brought an accession to the importance of the daily weather exchange, but introduced a new subject, climatology, into the work of the Office, which in England and Scotland had been the care of voluntary societies.

Thereupon the Scottish Society, through representatives in Parliament, demanded a subvention, and failing that, an inquiry into the administration. There was also much dissatisfaction about the marine work, and the inquiry was granted by the Treasury, who appointed a committee of inquiry under the Chairmanship of Sir William Stirling Maxwell.

Statistical Division.—Special Researches.

5. Upon the report of that Committee in 1877 the Treasury decided to revise the constitution, to place the actual direction as well as the general control of the Office in the hands of a paid Council appointed by the Royal Society with the sanction of the Treasury. The grant became £14,500. Climatological work was added to the obligations of the Office, and is now represented by the Statistical Division of the Office, which concerns itself with the publication of the official Year Book. Also by the same instrument "special research," which included experimental work of various kinds, was recognised as a legitimate object of expenditure.

Daily Information for Newspapers.—Evening Telegraph Service.

6. In 1879 the study of weather with the aid of daily telegrams and of self-recording instruments at observatories was pronounced to be sufficiently far advanced to justify the issue of forecasts, and they were accordingly issued at 11 a.m. daily to public offices and newspapers gratis, and to "subscribers." But "The Times" newspaper desired also an evening issue that might be printed in the morning paper. For some time the money necessary for the additional service was provided by "The Times" and subsequently by a syndicate of newspapers. Then the Government accepted the obligation and increased the grant first by £500 and subsequently by £300 more on that account. The Office was accordingly charged with a new duty—the supply of weather information in the evening to newspapers. It is now associated with evening duty for the Admiralty and Military Air Stations.

7. From 1880 things went on without change for more than twenty years, but in 1903 the Scottish Members of Parliament again demanded an inquiry on account of the failure of the Scottish Society to obtain a subvention sufficient to maintain the Observatory on Ben Nevis from the grant made to the Meteorological Office. Another inquiry was set on foot by the Treasury, and a committee appointed under the Chairmanship of Sir Herbert Maxwell. This Committee reported in 1904, and resulted ultimately in the Treasury Minute of 20th May, 1905, already referred to.

Réseau Mondial.—Library.

In the meantime the library had become a most important matter, and the compilation of information about climate and weather in the various parts of the British Empire practically constituted a new department of activity. The pressure on the one hand of the International Meteorological Committee and on the other hand of the study of Solar Physics, has gradually led to the recognition of an obligation towards a réseau mondial as specially incumbent upon the Meteorological Office as the central institution of its kind for the Empire. This has become part of the duty of the Secretarial and Library Division of the Office.

Investigation of the Upper Air.

Since the Meteorological Committee was constituted in 1905 many changes have supervened; telegrams from Iceland, wireless telegrams from ocean steamers, the air departments of the navy and the army, the absorption by the Office of the whole duty as regards climatology, previously discharged by the Societies with the aid of a subvention. The Office has also become the central institution for the meteorological investigation of the upper air. It has taken over the direct control of observatories which were previously under separate authorities, and this step has brought with it the responsibility of the Office for certain aspects of terrestrial magnetism, as well as of atmospheric electricity and seismology. These changes have been associated with an increase of the grant to £20,000.

Colonial Observations.

The Office has also become an advisory centre for the Colonies which have no separate meteorological organisation and it also assists the Meteorological Institutes of the Dominions in the selection and purchase of instruments.

British Rainfall Organization.

Thus the horizon of the work of the Office, which was originally limited to the collection and discussion of observations from the sea, has now become very wide ; still it does not include all the British meteorological interests. The important subject of rainfall in the British Isles is still the care of a private organisation—"The British Rainfall Organization." The Meteorological Office makes no attempt at the detailed representation of rainfall, and only deals with rainfall as part of climatology.

When, therefore, the application of meteorology to agriculture is considered, so far as the Meteorological Office is concerned, anything which is dependent upon the detailed study of the distribution of rainfall is not necessarily included.

In a recent communication to the Treasury, the purposes which the Office keeps in view have been defined in the following terms :—

"(i) The collection of observations from ships on all oceans, together with the discussion and publication of meteorological results, for the benefit of sailors, and as a contribution to the meteorology of the globe.

"(ii) The collection and publication of reports received by telegraph, and the issue of forecasts and storm-warnings based upon them.

"(iii) The maintenance of observatories and anemograph stations to furnish material for the scientific study of the phenomena of weather as exhibited on the daily charts, and the application of the study to the improvement of forecasting, and other purposes.

"(iv) The organisation and maintenance of a trustworthy public memory of the weather, which is available for reference at any time by all classes of the community, and which forms a basis for the study of the climatology of the United Kingdom in comparison with that of other countries, and in relation to agriculture, public health, and other public purposes ; the discussion of the observations with a view to the definition of climatic factors for this country in comparison with others, and ultimately to the relationships of seasons and the establishment of more general laws of climate and weather that should lead up to a reasoned forecast of coming seasons.

"(v) Co-operation with the British Dominions and foreign countries for improving the organisation and the instruments by which the purposes enumerated above are to be pursued, and for the effective representation of the meteorology of the globe."

Apart from the question of special researches by individuals at the Central Office or at the Observatories, the means which are adopted by the Committee for securing these objects are set out in the Circular 001 of which a copy is annexed, together with a copy of the latest report of the Committee, which gives on pp. 6–8 the names of the staff, consisting of about 80 persons.

These facts will enable His Excellency to form an opinion as to the rather complicated structure which is represented by the meteorological organisation of this country. References are given to the original documents which form the material through which the gradual development of the structure can be traced. It consists of a central office, with branch offices, observatories, and stations. The work of the central office is in five divisions, viz. :—

1. Marine Meteorology.
2. Forecasting, Storm-warnings, and Dynamical Meteorology.
3. Climatology and Statistics.
4. Instruments and equipment for observatories and stations.
5. Library, Inquiries, and Réseau Mondial.

Meteorology and Agriculture.

Some addition is necessary with regard to the important and difficult question of *la météorologie agricole*. It is really an open question whether the responsibility for the application of meteorology to agriculture belongs to the Meteorological Office or to the Board of Agriculture and Fisheries in England and the corresponding departments in Scotland and Ireland. The traditional attitude of the Meteorological Office is that it collects and digests meteorological information which the agriculturist can apply if he wishes, and from that point of view the following issues of the Meteorological Office are regarded as suitable.

Forecasts.

1. The *Daily Weather Report* with the provisions set out for telegraphing forecasts for a small fee to those who are willing to pay for the telegrams. Circular 001 (A-H), p. 9.

   Forecasts are prepared throughout the year each morning at 10 a.m. and each evening at 7 p.m., and during the harvest season—June to September—in the afternoon, specially for agriculturists. Circular 001 (A-H) p. 13.

Statistics.

2. The *Weekly Weather Report*, which was projected especially with a view to agriculture and public health, gives a summary of the pressure, temperature, sunshine, and wind in a form which was designed to be especially suitable for agricultural purposes. This report has now been continued for 36 years, and forms a homogeneous body of statistics

week by week which is, for that purpose, probably unrivalled in the world. But it has a very small circulation outside official circles.

3. The *Monthly Weather Report* which gives the usual climatological information for about 300 stations in the British Isles.

In actual practice these provisions are very little used by agriculturists. Many persons are willing to receive forecasts by telegraph but are unwilling to pay for the telegrams; it is entirely contrary to the instinct of the British race to pay for anything until its value has been made undeniably clear, so that the farmer and the Government are both waiting for the utility of the forecasts to be demonstrated beyond cavil. Yet that can only be done by trial, and nobody has yet been found who is willing to pay the cost of an adequate trial on a large scale. The Meteorological Office could, if the Committee wished, undertake that experiment, but it would mean diverting some of its funds from meteorological study to meteorological applications. It is naturally disposed to make quite sure of success before it embarks on a speculation of that kind, and certain success is the reward of careful study. No institution with scientific instincts is disposed to commit itself to the position that its knowlege is complete and that it can forego any further investigation, especially in such a subject as the study of weather.

The climatological aspect of *la météorologie agricole* is a matter of the greatest difficulty. The practical farmer has made his own study of weather and used it in his own way without committing the results to writing. The Meteorological Office commits a vast number of figures to print without knowing what their precise application to agriculture is. All are agreed that agriculture depends upon weather, but to ascertain the manner in which the figures of the meteorologist can be applied to supplement the farmer's practical experience of weather is a matter requiring something that approaches to genius.

The relations between the Meteorological Office and the Boards of Agriculture in the United Kingdom are of the happiest, but neither side knows exactly how or where to begin. Some progress has, however, been made in this country. Some years ago the Meteorological Office issued a note about the wheat crop in relation to the rainfall of the previous autumn, and this was taken up by a member of the staff of the Board of Agriculture, who produced a most valuable discussion by modern statistical methods of the relations of weather and crops for one district of England.

Education.

The further development of the application of meteorology to agriculture is largely dependent upon education in the rural schools. The study of weather is now becoming a part of education in many schools, rural as well as urban, so that the prospect of more effective organisation is good. The provision for this is shown in Circular E.03.

But thus far as regards organisation, at present the formal responsibility of the Office is limited to preparing forecasts and compiling statistics, which will be indispensable when further investigation has so far developed the laws of weather as to allow of forecasting coming seasons.

That is one of the avowed objects of the réseau mondial, and the work thereupon must therefore also be regarded as a contribution to *la météorologie agricole*, although the practical farmer would probably not so regard it.

Answers to Inquiries.

Perhaps the most valuable provision of the Meteorological Office at the present stage is the provision for answering inquiries about the weather on the part of the general public. Any public department and any private person may ask any question that can be answered by a knowledge of the facts and laws of weather, and to such questions answers are given with all the intelligence that the Office can command. Many inquiries are answered, and the inquirer often finds the Office to be possessed of information of which he was unaware.

This provision allows inquiry to be directed along the lines which the agriculturist opens; among the subjects which have already been the subject of inquiry may be mentioned—spring frosts, and the protection of vegetation by "smudging;" autumn frosts; the effect of gun-fire upon rainfall, particularly during harvest; spells of fine weather for harvest; temperature in relation to sugar-growing; the limits of forestation prescribed by temperature; atmospheric humidity in relation to brewing.

By watching the trend of these inquiries, and by the organisation of the means of preparing intelligent replies, the Meteorological Office hopes to approach the question of *la météorologie agricole* on lines suggested by agriculturists themselves, and at the same time by encouraging the development of weather study in schools to lead up to the spontaneous use of the information compiled in the Office.

If necessary, the form of the information which meteorologists have hitherto put forward as representing the main features of climatology will be altered so as to meet the needs of the agricultural inquirer.

In fine, it may be said that at present the Meteorological Office is more concerned with the means for organising *la météorologie agricole* on a satisfactory basis than with any organisation actually in operation.

W. N. SHAW.

Meteorological Office,
London, S.W.,
22nd December, 1914.

List of References to accompany Memorandum on the Organisation of the Meteorological Office in London, with special reference to Agricultural Meteorology:—

1. Abstract of Copy of Report of Conference held at Brussels respecting Meteorological Observations—1854.
2. Report of a Committee appointed to consider certain questions relating to the Meteorological Department of the Board of Trade—1866.

3. Report of the Treasury Committee appointed to inquire into the conditions and mode of Administration of the Annual Grant in Aid of Meteorological Observations—1877. (C.—1638).
4. Report of the Committee appointed to inquire into the Administration by the Meteorological Council of the existing Parliamentary Grant—1904. (Cd.—2123).

List of Enclosures to accompany above Memorandum :—

1. Copy of Treasury Minute, dated 20th May, 1905.
2. Circular 001 (A.—H.) : Meteorological Office—Statement of Provisions for the Supply of Information to the Public—General Provisions.
   Circular 001 (J.) : List of Ships, Observatories and Stations in connexion with the Meteorological Office.
   Circular 001 (K.—L.) : List of Publications issued by the Meteorological Office, &c.
3. Ninth Annual Report of the Meteorological Committee to the Lords Commissioners of His Majesty's Treasury—1914. (Cd. 7530.)
4. Circular E.03 : Meteorological Office—Arrangements for the Supply of Copies of the Daily Weather Report for use in Schools, and other Educational Provisions.
5. Specimen Copy of the Daily Weather Report.
6. Specimen Copy of the Weekly Weather Report.
7. Specimen Copy of the Monthly Weather Report.

Post Office.—*Revised Account for Postage* (Minutes 441, 449).—Reported—that the Accountant-General of the Post Office had made further inquiry regarding the undercharge for postage estimated by the Post Office at £68, and that at the request of the Director Mr. Barstow had been informed that the point had been raised by the Audit Office and that the Post Office is content not to pursue it if the Audit Office does not return to it.

Little Massingham.—*Sunshine Recorder* (Minute 486).—Reported—that permission had been obtained by the observer at Little Massingham on 26th November, 1914, to resume the sunshine record which had been discontinued at the request of the police. Eight days' records were lost.

British Rainfall Organization.—Read—letter 4883/O.503, dated 7th December, 1914, from the British Rainfall Organization, thanking the Committee for provisionally sanctioning an increase of £30 a year in the grant, and stating that arrangements for giving annual rainfall totals in millimetres as well as inches in "British Rainfall, 1914," will be put in hand at once.

Milner and Bickford.—*Subpœna.*—It was agreed, in circumstances explained, to excuse the payment of the balance of the fee payable on subpœna by Messrs. Milner and Bickford (Letter 4902/J.02).

Treasury.—Reported—personal correspondence with Sir Thomas Heath, Secretary to the Treasury, respecting an application for relief received from Mr. C. Vidal Diehl, formerly of the Newspaper Weather Bureau, whose occupation had been seriously affected by the war.

494. INTERNATIONAL METEOROLOGY.—**Daily Telegrams to Petrograd.**—Read—the following letter 373/Q.16 from the Director of the Russian Meteorological Service :—

Observatoire Physique Central Nicolas,
Petrograd,
11 Janvier, 1915.

CHER COLLEGUE,

J'ai l'honneur de Vous remercier profondement pour Votre aimable proposition d'organiser l'envoie des dépêches météorologiques de Votre pays à Petrograd. Avant la guerre nous recevions deux dépêches quotidiennes avec les observations de Vos stations : l'une, qui nous a été envoyée par Deutsche Seewarte à Hamburg, et une autre, qui était dirigée immédiatement de Londres à Petrograd via Christiania-Stockholm. La première, où la pression atmosphérique était donnée en millimètres et la température en dégrès centigrades, renfermait les observations des stations suivantes : Stornoway, Malin Head, Holyhead, Valencia, Dunrossness, Aberdeen, Shields, Yarmouth, Portland Bill et Scilly.

Une autre, qui ne nous parvenait, qu'avec un grand retard, c'est-à-dire ordinairement après 2h. p.m., avec la pression, exprimée en milibares, et la température en dégrès Fahrenheit, renfermait 8 stations, qui différaient tant soit peu de celles de la dépêche de Seewarte.

Je Vous serais très reconaissant pour l'envoie, aussitôt que possible, d'une dépêche quotidienne avec les observations du matin et du soir de la veille de Londres directement à Petrograd, renfermant les stations de l'Angleterre, que nous recevions jusqu'à présent avec l'aide de Deutsche Seewarte à Hamburg. Dans le cas,où la transmission gratuite d'une pareille dépêche par le temps qui court serait impossible, n'ayant pas les moyens speciaux pour ce but, je suis forcé d'attendre la réalisation de Votre proposition jusqu'à la fin de la guerre.

Agréez, Monsieur le Directeur et très honoré Collègue, l'assurance de ma considération la plus distinguée.

B. GALITZINE.

A Monsieur W. Shaw,
Directeur de Meteorological Office à Londres.

It was agreed to say that the matter must be postponed until after the end of the war.

495. Office Staff. — **Marine Superintendent.** — Read — Minute 443 of 28th January, 1914, respecting the appointment of Commander Hepworth as Marine Superintendent.

It was agreed that Commander Hepworth's appointment be continued till 31st March, 1916.

New Appointments.—Reported—the appointment of Miss Gertrude F. K. Skipton, born 22nd August, 1891, formerly of Roe Dean School (London Matriculation), as Clerk Computer, commencing at £75 a year, to date from 1st January, 1915. Miss Skipton had been appointed clerk on probation from 7th December, 1914, at £75 a year. (Order 354.)

Also—the temporary appointment of Miss E. M. Perkins, formerly of Newnham College, Cambridge Classical Tripos, as Professional Assistant with a salary of £125. The appointment is subject to one month's notice and is terminable with the special conditions of the war. (Order 361.)

Approved.

Superannuation.—*J. S. Harding, deceased.*—The Director reported that Mr. J. S. Harding, who had acted as private secretary to Admiral FitzRoy and had retired in 1906 from the office of chief clerk after service in the Office of more than fifty years, had died on 11th January.

Mr. Harding's superannuation allowance was provided by an annuity purchased from the Commissioners for the Reduction of the National Debt. (*See* Minutes 51, 59, 84.)

The necessary formalities have been complied with, and the sum payable to the Office by the Commissioners (£37 10*s.*, less income-tax) in respect of the post-obit quarter of the Annuity, will be forwarded to the Executrix of the will on production of the Probate, as soon as it is received from the Commissioners.

Approved.

496. Branch Office at South Farnborough. — Submitted — the following Memorandum :—

BRANCH OFFICE AT SOUTH FARNBOROUGH.

In a *Memorandum presented to the Advisory Committee for Aeronautics, on the present position of the experimental investigation of the atmosphere from the point of view of aviation, it was pointed out that further progress required more effective communication between practical airmen and the meteorologist who conducts the investigation, and that it was necessary for a flight assistant to be attached to the staff of the Office. The approaching retirement of the professional assistant at the Branch Office affords a peculiarly favourable opportunity for making the necessary changes in the organisation of the Branch Office.

The requirements are, first, the creation of a well-paid office commencing at, say, £500 and leading up to £800 a year, to be held by a man of exceptional scientific ability, with the duty of giving more advanced instruction in meteorology—especially the dynamics of the atmosphere—to the members of the Royal Flying Corps, of discussing with the members of the corps their experiences in relation to aerodynamics and physics, and of carrying out researches suggested by those experiences which may be expected to be of practical value to pilots in securing and maintaining the supremacy of British aircraft in the navigation of the air, by enabling them to take advantage of the most complete knowledge of the structure of the atmosphere and the dynamical conditions.

Such an officer should have a reasonably free hand in the selection of the researches to be undertaken and in the manner of pursuing them, and for that purpose he would need the services of a pilot and machine acting under his orders.

No such office at present exists, and the duties are more nearly described by the title of Professor than any other. But the importance of such duties in the present position of the Air Services of the Navy and Army make it desirable to put forward a proposal for its creation. Doubtless a great deal would depend upon the competence of the person selected for such an undertaking, but that need not prevent the attempt being made.

It is clear that such an officer could not be made subordinate to the officer in charge of the ordinary meteorological work, viz.:—Conducting the regular observations in connection with the daily weather service and forecasting, but that work ought not to be neglected. It could, however, be discharged by qualified assistants of a less expensive type. It makes rather strenuous demands in the matter of regular attendance on the instruments and telegraph, and needs a certain special training which the Meteorological Office is well fitted to supply. Two officers of this calibre ought to be on the Staff, because one ought to be available for occasional duty at the Central Office, or to visit meteorological stations as inspector, in order to keep himself in touch with the general organisation of co-operative meteorology.

Hitherto the experimental work has depended upon the initiative of the Director of the Office as a member of the Advisory Committee for Aeronautics, but the work of the Office is now so many-sided that the conduct of experimental researches at a distance is hardly possible.

* Printed in Minute 489, page 468.

If this duty were entrusted to a special officer, who would be most effectively described as a Professor of Meteorology, he would have to be in control of the assistants who carry on the regular work of observing and forecasting, and therefore be in charge of the Branch Office, and it would be desirable that he should be in personal touch with the Advisory Committee for Aeronautics.

The Staff of the Branch Office thus reconstituted would be :—

Professor of Meteorology	£500–£800
Meteorologist	£225–£300
Assistant Meteorologist	£125–£200
or Flying Assistant	£ –£
Clerical Assistant...	£75–£150
Laboratory Assistant (Boy)	£25– £50

Total, £950–£1,500.

The incidental expenses of instruments and of running the establishment would be about £200 a year in addition to the maintenance of an aeroplane.

The total works out at from £1,200 to £2,000 a year in place of the present £650. This is a large figure, but the work is of the utmost importance, and it is of little use to approach it without adequate resources.

The Air Services are accustomed in every part of their work to demand and get the best, and the meteorological side of the work labours under the disadvantage of having to deal with an intractable atmosphere. Any endeavour to meet their requirements must be put in such a form as to command their respect, and the lines of such an endeavour must be laid on a more ambitious scale than is customary with meteorological work.

There is reason to believe that this suggestion would be supported by the Officials of the Army Council and Aircraft Factory who are most nearly concerned therein.

It was agreed that the memorandum be forwarded for comments to Colonel Brancker, acting for General Henderson, at the War Office, and Mr. O'Gorman, Royal Aircraft Factory, and then submitted to the Treasury.

497. Observatories.—**Eskdale.**—*Seismology.*—Reported—that at the request of Mr. J. J. Shaw, of West Bromwich, the record of a seismograph designed by him and installed at Bidston, had been compared at Eskdalemuir with the Galitzin records, and found to be very good. Dr. Schuster has reported on the correspondence (84/CE90) that it would be desirable to establish Mr. Shaw's instrument at Eskdalemuir for a short time to compare it directly with the Galitzin instruments. Upon inquiry from Mr. Shaw it appears that a new instrument would have to be purchased for the purpose at a cost of £50. A letter has been received from Professor H. H. Turner, Chairman of the Seismological Committee of the British Association, supporting the suggestion that a similar instrument be provided and installed at Eskdalemuir. The consideration of the matter was postponed.

Magnet House —Submitted—the following memorandum on the heating and ventilation of the Magnet House :—

I.—Means of Warming and Ventilation provided at the Erection of the Observatory.

The original provision for ventilation in the Magnet house consisted of three inlet-tubes leading from three tile-channels in the earth-covering by copper tubes about 4 inches in diameter to the lower parts of three rectangular vertical shafts in the walls, which terminated in cowls about 14 feet above the top of the concrete cover of the house and about 4 feet above the earth-covering.

Just below the inlet-orifices the rectangular shafts were closed by copper plates which formed the tops of rectangular chambers intended as heating chambers. Copper tubes, 2 inches in diameter, led up from these heating chambers to the top parts of the shafts which were shut off again just below the ceiling level.

The copper tubes were intended to convey the products of combustion of paraffin lamps from the heating chambers to the outer cowls ; and, on the way, a large part of the heat of combustion was expected to pass to the air in the shaft, between the closing plates at top and bottom, and thus warm the air which entered from the outside. This was to form the heat-supply to the building ; while the copper tubes carried off the products of combustion, and with them a certain amount of air, thus forming the outlet-ventilation for the house.

There were, besides, two additional shafts leading direct from the ceiling of the outer chamber to cowls above, but these were not supposed to be required when the system was in regular operation. They were closed inside by doors and outside by india-rubber caps.

The two Magnetograph rooms east and west are separate isolated chambers within the house. Their ceilings are about 5 feet below the middle of the arched ceiling of the house. To provide for the ventilation of these rooms, channels were formed along the ground leading to the heating chambers from the floor of the Magnetograph rooms, while apertures were made in the upper parts of the walls to allow air to come in from the outer-house to replace that drawn away from the rooms by the copper upcast shafts.

There were thus eight openings to the outside air for ventilation ; three inlet openings, and five outlet openings of which two were provided with closing doors. Neglecting the effect of the wind, the original scheme of ventilation and warming may be summarised as follows :—

Ventilation.—Inlets.—Three 4-inch shafts delivering near floor level.
Outlets.—Three 2-inch copper pipes leading to cowls 25 feet above the inlets.
Motive power.—The difference of temperature of the three pairs of shafts.

Warming.—Three paraffin lamps in the heating chambers.

The conditions for the success of the scheme are calm weather and sufficient difference of temperature between the air in the extract and inlet shafts. The vertical distance available for the production of motive power was about 25 feet.

II.—Insufficiency of the Original Scheme.

The original scheme did not come into effective operation for five reasons. Firstly, the dampness of the interior on completion was beyond the control of the ventilation ; secondly, the proposed circulation between the Magnetograph rooms and the outside chamber was deranged by the heat of the illumination-burners ; thirdly, calm weather is very rare at Eskdalemuir and in strong winds the six separate openings to the outside were much more controlled by the differential effect of the wind than by the temperature differences ; fourthly, one of the extraction tubes was blocked by a sack left under the cowl by the builders ; and fifthly, the lamps provided for the heating chambers were too large for their position.

III.—Modifications of the Arrangement in 1910.

The ventilation was examined in June, 1910, and as doubt was thrown upon the efficiency of the narrow copper pipes, which certainly failed in the case of the stopped pipe, to carry off the products of combustion of the heating lamps, an experimental arrangement was made using only the upper 14 feet of the extraction shaft on the north side to carry off the products of combustion of all the burners in the house into one flue.

The experimental arrangement was as follows :—

Two wooden trunks were constructed leading from the tops of the two copper tubes on the south side to the central shaft on the north side, above the point of delivery of the copper tube there. The wooden trunks passed diagonally across the space above the ceilings of the Magnetograph rooms, and received from a flue in the centre of each room the heated air from the illuminating lamps. Thus the products of combustion from the three heating lamps (for which acetylene burners were provisionally substituted) and from the illuminating burners in the rooms were gathered together into one flue which was further provided with an acetylene jet to supply additional motive power.

At the same time the inlet openings which had been originally left freely exposed to the wind were covered with boxes as a temporary expedient to reduce the effect of high winds to which they were obviously liable.

With the experimental arrangement the condition of the Magnet house was reported as satisfactory during 1911 and until the summer of 1912, when the accumulation of water in the Magnet house overweighted all other considerations. Since that time little regard has been paid to the provision for heating and ventilation and attention has been concentrated upon replacing the woodwork affected by the damp and determining the source from which the water is derived.

IV.—Outstanding Points requiring Consideration.

Observations of the local conditions have now accumulated sufficiently to form an accurate judgment on many points which were previously matters of conjecture, and a further examination of the ventilation at the present time (July, 1914) shows :

(1) When the heating chambers are working with the acetylene burners, the copper tubes are effective in carrying off the products of combustion. For the Magnetograph rooms, the wooden trunks operate when the gas burners at the ceiling are lighted, but not sufficiently to give adequate ventilation. It is possible that the trunks have become defective, but it may be remarked that the conditions in July are the most unfavourable for success, as the air in the inlet tube, which has a vertical range of about 20 feet, is warmer than the air in the house, and the vertical length of available upcast is not more than 14 feet. Consequently the temperature of the air in the upcast must be raised considerably before it is effective in the production of motive power against the incoming air, unless it is aided adventitiously by wind. Measurements of the amount of carbonic acid in the air show more than 20 parts per 10,000 of air ; and that is beyond the Home Office limit and much beyond what ought to be allowed in the Magnet house.

(2) The total amount of air coming in by the inlets provided is about 50 cubic metres per hour ; and to that must be added what gets into the house under the doorways of the porch and thence through the plaster work which has been cut for examination purposes. That a considerable amount of air enters in this way is evident from the drip of water from the glass and woodwork of the partitions separating the three access chambers. The total supply of air is probably sufficient, but the removal of carbonic acid gas from the east Magnetograph room, the only one now being used, is not sufficient ; the atmosphere there is not fresh enough. For the west room, when no lamps are burning, there is practically no ventilation, as the channels leading to the heating lamps have been cut for the examination of the source of the water. The room depends for any change of air upon what motion takes place through the openings near floor and ceiling, and that must be a negligible quantity.

For many months, through inadvertence, the house has been without any artificial heating except that which is incidental to the illumination of the instruments.

These four points must be dealt with. The most important and most difficult matter is the obviating of the disturbance due to wind. A preliminary, but hitherto a dominant, consideration is whether the accumulation of water which still goes on in the Magnet house must be attributed to the percolation of water through the walls, or can be controlled by warming and ventilation.

The uncertainty on this point, which has paralysed all effective action hitherto, arises from the fact that normally during the months of May, June, July and August, the temperature of the Magnet house is below the temperature of the outside air and, when that air is nearly saturated, below the dew point. In the absence of adequate artificial warming during these months, a considerable amount of water is certainly formed inside the house by condensation from the incoming air. The same may occur in abnormal conditions of weather in other months.

For the examination of the question of the soundness of the walls, channels have been cut in the floors in order that the drip may be collected, and the following amounts of water have recently been gathered in this way :—

1914 :	January	105 cc.
	February	410 „
	March	60 „
	April	20 „
	May	65 „
	June	280 „

This is a very crude estimate of the accumulation of water ; it takes no account of any water which soaks into the woodwork and walls.

The measurements have been made at irregular intervals. The periods here specified as months are those nearest thereto in the observation book.

The rainfall measured at Eskdalemuir, for the corresponding actual months, is as follows :—

January	5·09 ins.
February	8·50 „
March	6·20 „
April	3·08 „
May	2·88 „
June	1·61 „

It may be surmised that the wet weather of February influenced the drip. On the other hand the dry June is also associated with an increased drip.

There is undoubtedly a drip in the north ventilating shaft which cannot be attributed to condensation and should be carefully watched.

A calculation shows that with the normal conditions prevailing in July, mean air temperature 58° F., wet bulb 55·6° F., temperature of the Magnet house 52° F., with 100 cubic metres of air entering per hour, 50 litres (about 1 cwt.) of deposited water may be expected during the month. Hence, when all necessary allowances are made, the amount collected in the house is not so large as to preclude the possibility of the excessive dampness being entirely due to condensation.

V.—Proposals for putting the Warming and Ventilation on a proper footing.

It is proposed to assume, for the time being, that the walls are sound, and to consider the system of ventilation with a view to preventing condensation altogether, and of providing for sufficient renewal of the air in the Magnetograph rooms. This may be attempted in the following manner :—

1. Use the northern outlet shaft for the removal of air from the Magnetograph rooms only, and the southern outlet shafts for taking air from the outer house. Bring all three outlet orifices by outside communication between the cowls into a central delivery shaft so that the effect of the wind would be the same upon all the shafts and under control.
2. Form a special inlet orifice above the roof which would communicate with each of the existing inlet tubes and would be so arranged as to take troughs of desiccating material.
3. Abstract water from the entering air by chloride of calcium and from the interior of the Magnet house by chloride of calcium or quick-lime.
4. Supply enough heat at suitable times of the year to keep the temperature on the whole about 3° higher than it is now.

It is to be remarked that the careful protection of the Magnet house against the free exchange of air with the outside is only necessary in order to preserve a uniform temperature inside the house. There would be no objection to a free exchange of air if the temperature of the outside air did not differ from that of the Magnetograph rooms by more than half a degree centigrade either way. It would appear from the temperature figures (see Appendix) that the temperature of the Magnetograph rooms is controlled immediately by the temperature of the walls and not by the temperature of the air supply. It takes some three months for the effect of the summer rise of air-temperature and the winter fall of air-temperature, by which the temperature of the ground and walls is ultimately controlled, to reach their maximum inside the Magnetograph rooms. Whether this condition would be altered by a considerable increase of the air supply is a question which can only be answered by suitable experiments and observations.

Hitherto the Magnet house has been kept rigorously closed against all casual exchange of air with the outside, but it is apparent that on the occasions when the temperature of the outside air is within half a degree of the temperature of the Magnetograph chamber and is at the same time dry, that is to say, when its humidity is less than 80 per cent., the Magnet house might with advantage be thrown open as far as possible with careful supervision to provide for its being closed when the temperature varied too much from that of the interior.

The months during which this action would be most frequently practicable are April, May August, and September, but occasions might arise in the other months also.

Taking, for example, the month of April, 1911, and assuming a uniform temperature in the interior of 281·5°A throughout the month, in order to simplify comparison, we find in the tables that the hourly temperature was between 281°A and 282°A on :—

April 1. 13h.–15h. with humidity, 68–65 p.c.
11. 16h.–18h. with humidity, 77–73.
13. 19h. with humidity. 73.
14. 10h., 11h., 17h. with humidity, 65, 63, 65.
15. 10h., 13h., 14h. with humidity, 75, 75, 82.
16. 11h., 12h. with humidity, 66, 57.
o. 18. 10h., 12h., 13h., 14h., 17h., to 20h. with humidity, 87, 82, 90, 91, 97, 99.
19. 10h.–12h., 14h., 16h. with humidity, 70–66, 72, 77.
o. 22. 10h.–12h., 14h., 15h. with humidity, 100–99, 100, 100.
o. 23. 8h.–13h., 17h., 18h. with humidity, 98–92, 97, 89.
o. 24. 22h., 23h. with humidity, 100, 100.
o. 25. 12h., 14h. with humidity, 100, 100.
26. 13h., 16h. with humidity, 76, 67.
o. 28. 13h., 14h. with humidity, 86–95.
29. 13h. with humidity, 84.
30. 13h., 14h., 16h. with humidity, 62, 62, 63.

Thus, so far as temperature was concerned, the Magnet house might have been fully opened for 51 hours in April, 1911, and of those hours the air was suitably dry during 26.

It is therefore desirable that the state of the outside air as regards temperature and humidity should be watched, and the Magnet house opened on suitable occasions as much as possible. This could be managed without difficulty by having light flap-doors to one of each of the two pairs of cowl-openings and to the openings of the shafts within the house, and as constant personal watching would be tedious it would be desirable to have the flap-doors actuated automatically and, consequently, a fifth item may be added to the four already mentioned, viz. :—

5. Provide an automatic arrangement for opening the flap-doors of the additional ventilation shafts when the outside air is dry, and the temperatures inside and outside are the same.

VI.—Detailed consideration of the several Items of the Proposal.

1. *Modification of the Outlets so that all deliver into one Shaft.*

For this purpose the three existing shafts and cowls could remain as now. Form a vertical shaft of 12-inch drain-tiles on the middle line of the earth-cover with three 4-inch openings on a level just below the orifices of the cowls. Connect one opening of each of the three cowls with the corresponding opening in the central shaft by wooden trunks to give a fair way of 4 ins. × 4 ins. Protect the wooden trunks against the weather by covering with sheet lead or zinc. Carry the drain-tile shaft up to a level of 3 feet above the point of delivery of the trunks and finish with a cowl of a pattern to be selected.

The drain-tile shaft is to go down far enough in the earth to be secure, if necessary down to the roof of the house. It can be open at the bottom and filled up to the outside earth level with broken stones (or ? concrete).

The arrangement is shown in the sketch A. The centre line of the drain-tile shaft is 1 ft. 6 in. east of the centre of the roof.

2. *The Central Inlet Cowl for the three Inlet-tubes with provision for inserting Desiccating Material.*

Carry transversely across the roof about two feet deep in the earth-covering 1 ft. 6 in. to the west of the middle transverse line a horizontal 12-inch tile-drain. The full openings north and south are to be closed by a shaped circular wood bung with india-rubber rim. The tile at each end is to have three openings for 4-inch pipes, two leading east and west, the third downwards. The openings are to be close to the bungs. Of the four horizontal ones three are to be connected by 4-inch lead or copper tube with the inlet openings, and the other blocked. The opening leading downwards is to take the drip of a calcium-chloride trough which may be inserted in the 12-inch channel. The sketch A indicates the suggested arrangement.

The calcium-chloride trough is a wooden trough 5 ft. 6 in. × 6 in., lined with thin sheet lead and provided with a draining tube which will drip into a lead funnel with tube attachment fixed into the downward opening. The arrangement is as shown in the sketch B.

The central tile of the tile-channel is to have a 6-inch opening in the west side and into it is to be fixed a 6-inch tube leading to a 9-inch vertical tile as shown in sketch C.

The vertical tile is to be continued up to four inches above the surface and then stop. It will receive a cowl consisting of a number of flat pieces of copper separated by $\frac{1}{4}$-in. spaces. Dimensions to be determined.

The cowl is to be four inches from the surface level and is intended to protect the inlet against the effect of wind. The vertical 9-inch tile is to be open at bottom and filled up to near the level of the side opening with pebbles.

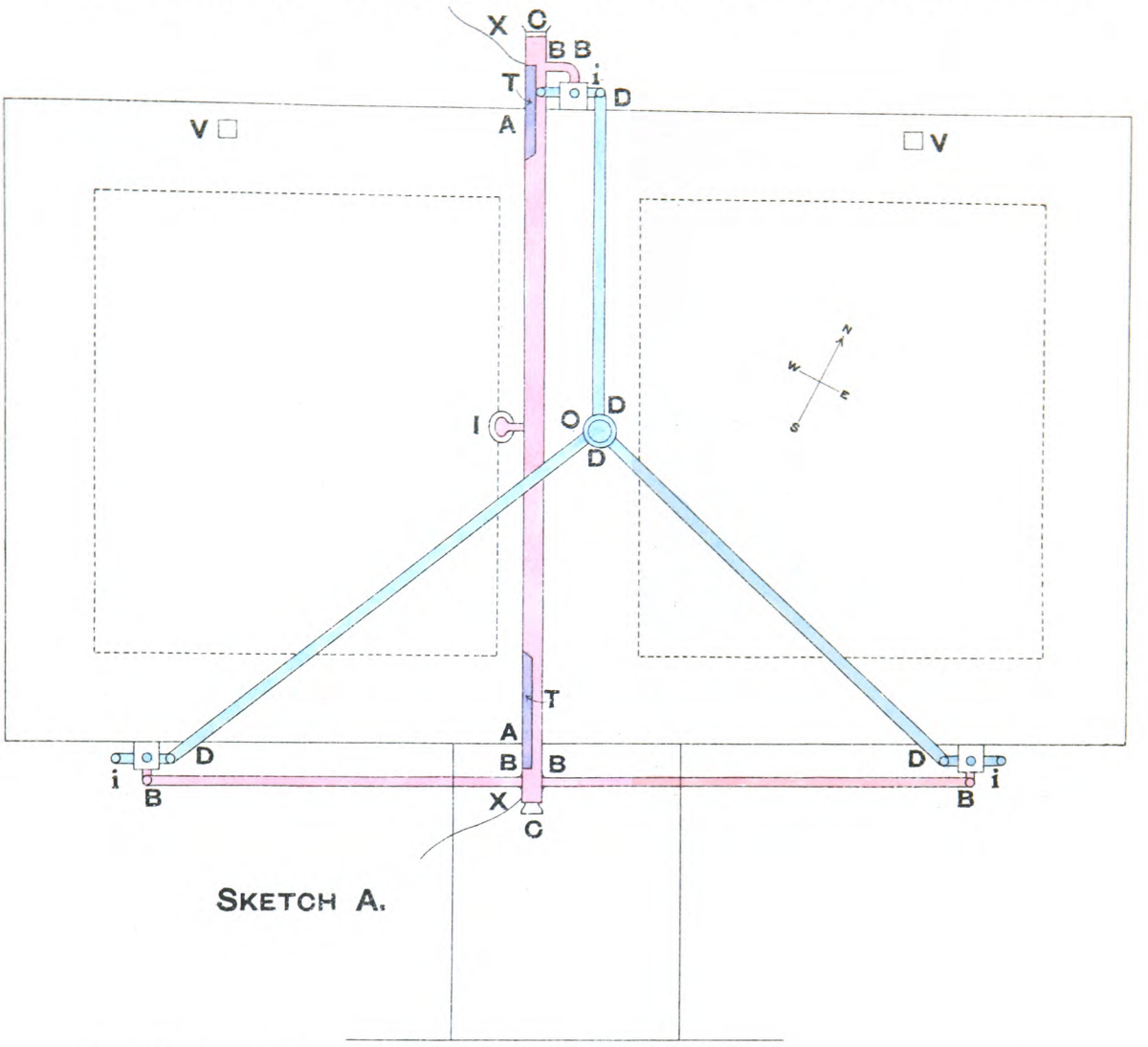
The direct communication between the two heating chambers and the cowls on the south side by means of copper tubes should be restored by re-connecting the tubes where they have been cut. The 4-inch wooden trunks from the heads of these shafts may be removed and used for the outlet system above the roof. The 6-inch trunks leading to the northern outlet would remain to carry away air from the Magnetograph rooms. The arrangements in the northern outlet shaft would remain as at present, but a framed glass panel should be provided in place of the present wooden panel, so

to face p. 490.

ESKDALE OBSERVATORY.

VENTILATION OF MAGNET HOUSE.

INLET SYSTEM COLOURED RED. OUTLET SYSTEM COLOURED BLUE.

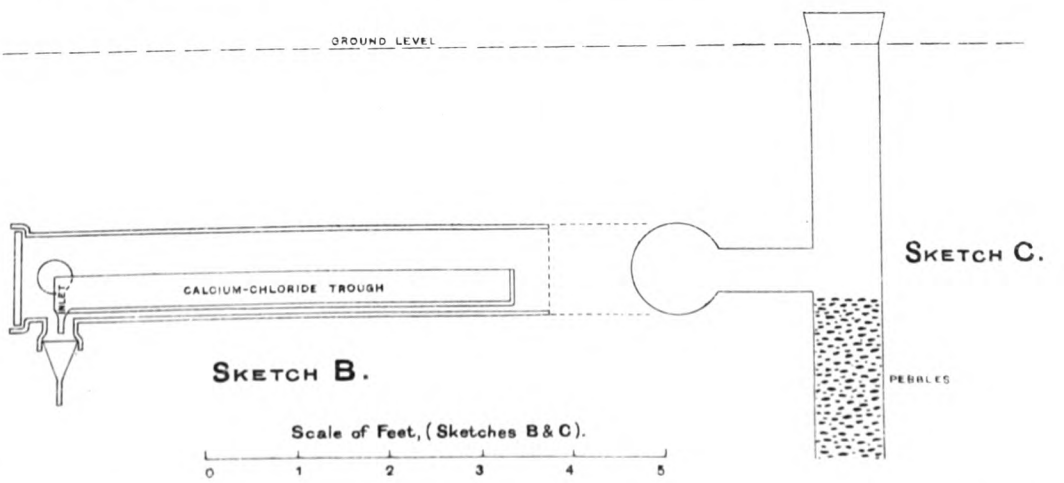


SKETCH A.

REFERENCES :—

Inlet System.—I. Central inlet opening: 9-inch vertical drain-tile with open bottom and special cowl on top leading to **A A,** across channel of 12-inch drain-tiles buried in the earth cover with the ends projecting from the earth on each side. **C C.** Caps closing the cross channel which can be removed at will for the insertion of calcium-chloride troughs **T T. B B.** Four inch connexions in lead or copper leading to **i i i,** the existing inlet tubes. **X X.** Drainage pipes.

Outlet System.—O. Central extraction orifice: 12-inch drain-tile shaft standing in earth or on the concrete cover of the magnet house filled up to earth level with clean pebbles. **D D.** Connexions by wooden trunk covered with sheet lead between the central extraction shaft and one of the two openings of each of the existing cowls. Automatic opener **V V** in the position of existing ventilators.



SKETCH B.

SKETCH C.

Scale of Feet, (Sketches B & C).

0 1 2 3 4 5

Wyman & Sons, Ltd., Litho M.O. Press, London, S.W.

that the burning of the acetylene jet in the flue may be under observation. There is reason to believe that the jet has remained turned on but unlighted for some time, and this contingency must be avoided.

The channels of communication between the Magnetograph rooms and the heating chambers should be restored and the copper sliding doors of the heating chambers should have glass panels in them.

The provision for ventilation thus indicated may be summarised as follows :—

Inlets.—Three 4-inch tubes leading from a central cowl to the bottoms of the shafts above the heating chambers.

Outlets.—For each of the Magnetograph rooms :—A 6-inch trunk leading to the northern shaft and thence by the cowl and an external horizontal trunk to the central outlet shaft.

For the outer chamber :—Two 2-inch copper tubes leading directly to cowls and thence by external horizontal trunks to the central outlet shaft; one 2-inch copper tube leading to the shaft which receives the air from the Magnetograph rooms.

Motive Power.—For the southern outlets :—The excess temperature of 25 feet of air warmed by the heating lamps.

For the northern outlet :—The excess temperature of 11 feet of air warmed by the heating lamp, and 14 feet of air warmed (1) by the delivery of warm air from the copper tube ; (2) by the heated air removed from the Magnetograph rooms ; and (3), if necessary, by the special acetylene burner.

No motive power is assigned to the wind. The effect of the wind upon the central inlet shaft is to be avoided by a special form of cowl, and its effect upon the central outlet shaft is also to be under control and brought into operation if needed.

The amount of ventilation which is contemplated is about 100 cubic metres per hour. If the necessary amount is not realised, the figure can be raised by utilising the effect of wind upon the central outlet shaft. In that case a special covering will have to be designed, but observations of the thermal effect of increased ventilation without additional warming must be obtained before that step is undertaken.

3. *Desiccation by Calcium Chloride and Quick-lime.*

Troughs for calcium chloride are to be similar to the one described under 2, 5 ft. long, 6 ins. × 6 ins. in section, lined with thin sheet lead with a drainage hole, funnel shaped, at one end to allow the liquefied salt to drip away to a bucket beneath. Two such troughs are to be placed in the stairway leading from the porch to the Magnet house to prevent condensation in the access chamber doors. The liquid drained away from the calcium chloride is to be treated with some phosphate and used on the land.

Quick-lime is to be used in the Magnetograph rooms, as it will absorb carbonic acid as well as moisture. It is to be set out in the pans previously used for calcium chloride.

4. *Heat Supply.*

Three copper lamps with Hinks's duplex burners or their equivalent in the heating chambers. The lamps burn about ¼-gallon of paraffin oil in 24 hours. The three together will use about one gallon a day. The heat produced by the combustion of one gallon of paraffin is sufficient to raise the temperature of 40 tons of water one degree. The cubical content of the walls, ceilings and floors of the Magnet house is 750 cubic metres, weighing about 1,500 tons. Thermally, 1,500 tons of stone are equivalent to 300 tons of water.

The three lamps, burning together a gallon of oil a day, would produce heat enough to raise 40 tons of water or 200 tons of stone one degree centigrade. Supposing one half of the heat to be lost in ventilation, the remainder goes to the stone work as the temperature of the internal air does not rise appreciably in consequence of the combustion. The rise of temperature, if all the stone is equally affected, would be one-tenth of a degree and thus three degrees in a month, making no allowance for loss to earth. When kept on for three months, it might raise the temperature of the stone work three degrees, and if lighted in the beginning of October and kept on till 31st March, might prevent some of the fall of temperature in winter and bring the maximum of the internal temperature to July, and thus secure greater uniformity of temperature.

5. *Automatic operation of the Flap-doors of the additional Ventilators.*

The flap-doors are one at the outer orifice of the cowl and the other at the ceiling opening of the shaft.

The flap-door of one of the outer openings of the cowl can be operated automatically for "wet and dry" without any difficulty by a hemp- or gut-cord (passing round a pair of pulleys, if necessary, to give the required length). The cord and pulleys would have to be protected against wind and weather, and they could be housed in a louvred screen fixed to the north side of the shaft.

The flap-door at the ceiling base of the shaft must be operated by the working of two 20-litre cylinders (70 cm. long and 10 cm. radius) on the principle of the differential air thermometer. The two bulbs of the differential thermometer may be two copper cylinders with conical ends. One would be in the louvred screen on the outside of the north side of the shaft, and the other inside the Magnet house 24 feet below. Communication between the two cylinders would be by compo-tube leading through the spare orifice of the cowl and down the shaft. At the bottom of the shaft an extension of rectangular section would be fitted that would allow the communication tube to pass through its side and carry a rectangular flap-door, opening inwards. By having the inlet flap-door on the cowl openings, in each case the one nearer the middle of the roof, the wind

component from either west or east would cause a circulation, and by having the internal flap-doors open inwards it would follow that a too violent wind would close them, so that the apparatus would deal automatically with the disturbance of strong winds.

The louvred screen on the north side of the shaft would accommodate both the frame of hemp-cord and the outside "bulb" of the differential air thermometer.

The details of the automatic opening and closing would have to be worked out at the Observatory, and the apparatus could be constructed there.

W. N. SHAW.

25th July, 1914.

APPENDIX.

MONTHLY MEAN TEMPERATURES of the EXTERNAL AIR and the MAGNET HOUSE for the TWO YEARS for which INFORMATION has been PUBLISHED.

	External Air.		Magnet House.	
	1911.	1912.	1911.	1912.
January	276·1	274·5	283·1	282·9
February	275·7	275·9	282·5	281·9
March	275·8	277·4	282·1	281·7
April	278·1	279·5	281·9	281·7
May	283·2	281·6	282·0	282·0
June	284·7	284·0	283·0	282·8
July	287·2	286·1	283·9	283·7
August	286·9	283·2	284·9	284·6
September	282·9	281·6	285·9	285·0
October	283·8	279·3	285·5	285·0
November	281·7	277·1	284·8	284·2
December	277·4	276·8	283·7	283·4
Year	281·1	279·8	283·6	283·2

The monthly average of humidity reaches a maximum of about 90 per cent. in the night and early morning, being highest in the summer. It has an average minimum of from 60 per cent. to 70 per cent. in the middle of the day in summer but over 80 per cent. from October to March.

Valencia. *Superintendent.*—Reported—that the following draft regulations for the appointment of a Superintendent of Valencia Observatory had been drawn up in conjunction with the Chairman of the Gassiot Committee.

METEOROLOGICAL OFFICE OBSERVATORIES.

Mr. J. E. Cullum, Superintendent of the Western Observatory of the Office (Valencia Observatory, Cahirciveen, Co. Kerry), retires on 31st March, 1915, on account of age, and the Meteorological Committee, on the nomination of the Royal Society, are prepared to appoint a successor as from that date, in accordance with the regulations which are detailed below.

The premises belonging to the Committee, to which the Observatory buildings are attached, comprise a dwelling-house (known as Westwood House) and 18 acres of land. The northern boundary of the land is the railway from Cahirciveen to the Ferry across to Valencia Island, and the Observatory is about a mile from Cahirciveen Station. Part of the land is let for grazing.

The present Superintendent has taken entire charge of the property in the interest of the Office. He has occupied the house free of rent, rates and taxes, and he has entertained as guests, inspectors or other official visitors, for short periods.

Hitherto the work has been carried on by the Superintendent living in the house and an assistant, whose home is on Valencia Island. There have been allowances for a handyman and a domestic servant for the Observatory.

Regulations.

1. The staff of the Observatory is determined from time to time by the Meteorological Committee.

2. The staff and administration of the Observatory are under the control of the Director of the Meteorological Office, subject to regulations laid down from time to time by the Meteorological Committee.

3. The official work of the Observatory is :—

i. To maintain a Telegraphic Reporting Station for the Meteorological Office, as set out in the "Instructions for Meteorological Telegraphy" (M.O. 2).

ii. To maintain a Meteorological Station of the First Order with self-recording instruments, as set forth in the Report of the Meteorological Committee of the Royal Society, 1867 and 1868, and of the Meteorological Council, 1889-90.

iii. To carry out auxiliary observations or researches in the physics of the Air and the Earth.

iv. To make regular observations of the terrestial magnetic elements.

4. The members of the Observatory staff are appointed by, and are subject to dismissal by, the Director acting on behalf of the Meteorological Committee, in accordance with Treasury Minutes dated 20th May, 1905, and 31st March, 1910.

5. Monthly salaries are payable directly from the Meteorological Office, weekly salaries and other disbursements are, as a rule, payable by the Superintendent out of funds provided by the Meteorological Committee.

6. The salary of the Superintendent is £300 a year, of which £30 is set aside as a premium for endowment assurance, which will mature at the age of 60 years.

The Superintendent occupies the residential quarters free of rent, rates and taxes, estimated at £40 per annum.

The appointment is terminable by six months' notice, to expire on 31st March.

7. The Superintendent may be transferred for duty at any time to one of the other establishments of the Office.

8. The Superintendent will take charge of the property in the interests of the Meteorological Office and will provide hospitality at the Observatory for an inspector or official visitor staying for a few days, on an allowance of 6s. a day payable by the Office.

9. When full staff is available, leave of absence not exceeding six weeks from the Observatory in each year will be granted, provided that the requirements of the Meterological Office admit.

Special facilities will be given, so far as the requirements of the service permit, for the absence of the Superintendent to give a course of lectures in an approved institution.

10. The Superintendent is not allowed to act as the regular correspondent of a daily paper, nor to supply for copyright publication information which might properly be issued in Official Publications or communicated to scientific journals, nor, without the permission of the Director, to make communications to journals on subjects with which the work of the Observatory is concerned.

Meteorological Office,
London, S.W.
24th December, 1914.

Approved.

Observations at 3 *a.m.*—Reported—that in the absence of the necessary telegraphic facilities at the Observatory, Cahirciveen, arrangements had been made for daily observations at 3 a.m. at the Post Office "Wireless" Station on Valencia Island, which is in continuous telegraphic communication with London. A barometer has been lent to the Wireless Station from the Observatory, and a new large-size barograph with charts has been provided for reporting barometric tendency.

The Post Office is making inquiry as to the cost of telephonic communication between the Observatory and the "Wireless" Station.

498. Daily Weather Service.—**Stations.**—*Dover and Newquay.*—Read—letter 252/S.2 from the Town Clerk of Dover, inquiring whether arrangements can be made for payment by the Office of the cost of the morning messages reporting the 7 a.m. observations; also correspondence (284/S 2) with the Clerk to the Council of Newquay respecting his proposal to discontinue daily reports of weather by telegraph during the continuance of the war.

It was agreed that the cost of the 7 a.m. messages from Dover be borne by the Office during the continuance of the war and, if necessary, also the cost of the messages from Newquay.

3 a.m. Service.—Reported—Order 358, authorising the payment of £2 a quarter additional to the observer at Holyhead, dating from 1st October, 1914, in consideration of special reports daily at 3 a.m. during the continuance of that service on behalf of the naval and military authorities.

Sunday Duty.—Reported—Order 359, providing for continuous attendance at the Office on Sundays as from 1st January, of a forecaster to answer official inquiries, at an increase of Special Service Pay from 20 to 25 per cent. of the ordinary salary; and providing further for extra attendance on Sundays of assistants in the Forecast Division, the Special Service Pay being increased to 22½ per cent. of the ordinary salary.

499. Office Premises.—**Cost of Telephones.**—Submitted—the following Memorandum showing a comparison between the present cost of the exchange and house telephone systems as installed in the Office, and an alternative system, in which the present house telephones would be removed and exchange extensions provided in the rooms instead. In the alternative arrangement communication by telephone between any two rooms in the office would be established through the office telephone exchange, instead of directly as at present.

TELEPHONES.

COST OF EXCHANGE AND HOUSE SYSTEMS AT SOUTH KENSINGTON.

	£ s. d.	Per Annum. £ s. d.
Present Cost :—		
Exchange Line 5821, unlimited	17 0 0	
„ „ 5820 „	14 0 0	
Extensions, 9 at £1 10*s.* 0*d.*	13 10 0	
	44 10 0	
House telephones, 20-way	30 4 0	
		74 14 0

Cost of installation, using Exchange extensions instead of House system :—

	£ s. d.	£ s. d
Exchange Lines as before	31 0 0	
Extensions, 22 at £1 10*s.* 0*d.*	33 0 0	
20 where present house instruments are.		
1 Lithographic press		
1 extension by switchboard.		
		64 0 0

Saving £10 14*s.* per annum.

Note.—The following may be found unnecessary :—
Extension at Switchboard.
Extension to Packing Room.

It was agreed to continue the direct house telephones for the present, in view of the additional attention required at a switchboard of twenty extensions.

Alteration of Delivery Tube for Telegrams.—Reported—that the tube for the delivery of telegrams to the forecast room had been altered so as to provide an alternative opening for delivery in the telephone exchange room. Telegrams will be delivered on the forecaster's table as hitherto during the regular forecasting periods of the day, and the occasional telegrams received during the remainder of the day will be delivered in the telephone exchange room, where they can be dealt with by the telephone clerk on duty there.

500. PUBLICATIONS.—**Weekly Weather Report.**—Reported—that commencing from 1915 a number of stations not used in computing district values have been omitted from the Report in order to relieve the congestion on pp. 2, 3 of each issue. Rainfall is expressed both in millimetres and inches, and most of the notes which were repeated weekly will be printed on a separate sheet and issued quarterly. Accumulated temperature for individual stations is no longer given, but the district values of accumulated temperature are published as usual.

Monthly Meteorological Charts.—Reported—that intimation had been made to the Controller of the Stationery Office that the representation of ocean currents on the Monthly Meteorological Charts will be changed from April next to conform with that adopted in publications of the Hydrographic Office, and that a request had been made at the same time for consideration to be given to the proposal that in the interests of accuracy and economy, many of the stones used for the printing of the charts might be preserved in permanent form on zinc or other metal plates.

Geophysical Memoirs, No. 11.—Copies of this Memoir, which had recently been issued, were laid on the table.

Annual Return of Cost of Printing Books and Forms.—Reported—that the Accountant of the Stationery Office had requested that the preparation of the annual return of the cost of printing, paper, binding, &c., might be dispensed with this year owing to the abnormal pressure of work, as its preparation required a fortnight's time of a clerk.

It was agreed that it is desirable that the Committee should, if possible, be acquainted with the cost of the printing, &c., carried out on their behalf, and that the Accountant be asked if he could supply a less detailed statement which could be copied from existing records.

Sale of Publications.—(Minute 430).—Reported—that arrangements had been made for a half-page advertisement of Geophysical Memoirs to appear in the February

number of "Symons's Meteorological Magazine." It is proposed to insert similar advertisements of other Office publications in the magazine month by month until the end of the year, at a cost of 12*s.* 6*d.* per month.

501. METEOROLOGICAL OFFICE, EDINBURGH.—Submitted—the following :—

COMMITTEE FOR THE METEOROLOGIAL OFFICE, EDINBURGH.

THIRD MEETING.

Minutes of Meeting held in the rooms of the Scottish Meteorological Society, 122, George Street, Edinburgh, on Monday, 14th December, 1914, at 2.30 p.m.

There were present :—

Dr. W. N. SHAW, in the chair ;
Mr. J. MACKAY BERNARD ;
Sir JAMES PATTEN MACDOUGALL, C.B. ;
Professor SAMPSON ;
Dr. E. M. WEDDERBURN ; and
Mr. A. WATT, Secretary.

Dr. Shaw noted with pleasure that since the last meeting of the Committee the Registrar-General for Scotland had received the honour of Knighthood, and that another member of the Committee, Mr. R. B. Greig, had received the Honorary Degree of Doctor of Laws from the University of St. Andrews. Dr. Greig, who was not present, was with the colours as a Captain in the First Edinburgh Battalion.

Minutes.—The Minutes of Meeting held on 1st December, 1913, which had been circulated, were approved.

Report of Work for Year ending 31*st March*, 1914.—This report, which had already been published in the Ninth Annual Report of the Meteorological Committee (pp. 49–50), was considered in detail. It was reported that since 31st March work had proceeded in a normal manner, and that new stations had been established at Banff and at Liberton, near Edinburgh, in connection with the Experimental Garden of the Edinburgh and East of Scotland College of Agriculture. The Registrar-General explained that he regarded the meteorological reports supplied to him as of even greater importance than before, in view of the fact that his department was now responsible for the Public Health Statistics which had previously been issued by the Local Government Board.

Accounts for Year ending 31*st March*, 1914.—It was reported that the financial statement submitted to the Meteorological Committee had been as follows :—

STATEMENT of ACCOUNT of SCOTTISH METEOROLOGICAL SOCIETY with the METEOROLOGICAL COMMITTEE for YEAR ending 31st MARCH, 1914.

Receipts.	£	*s.*	*d.*
From the Meteorological Committee	350	0	0
On account of reports supplied to the Registrar-General for Scotland ...	100	0	0
	£450	0	0

Expenditure.	£	*s.*	*d.*	£	*s.*	*d.*
1. Salaries :						
Superintendent	250	0	0			
Assistants	104	2	7			
Occasional assistance... ...	7	15	0			
				361	17	7
Workmen's Compensation Insurance				0	10	9
National Health Insurance ...				1	3	6
2. Furniture and fittings				8	9	4
3. Binding schedules and official reports				4	17	6
4. Stationery and postages :—						
Supply of schedules and notebooks for nine months, April–December, 1913 ...	6	0	0			
Stamps to observers—nine months	1	15	0			
Postages repaid M.O. for 1914	3	1	2			
Correspondence, say	1	5	2			
				12	1	4
				389	0	0
Leaving balance carried forward..				61	0	0
				£450	0	0

(Signed) WILLIAM B. WILSON,
Honorary Treasurer.

The Committee took note that for the year 1914–15 a sum of £373 would be required for salaries, and a sum not exceeding £100 for office furnishings.

Supply of Information and Charges therefor.—The following regulations were approved :—

> The official publications of the Offices in London and Edinburgh and such manuscript returns as are filed in Edinburgh may be consulted or copied at the Office free of charge, by any person, by permission of the Superintendent. Extracts from them are supplied to any person making written application to the Superintendent specifying precisely the details of the information required. For these extracts a charge is made to cover the cost of the time required for selecting and making them. The usual minimum charge is 5*s*. [There are certain special exceptions with a smaller charge ; a schedule of these will be sent on application.]
>
> The extracts will, if required, be attested by a sworn declaration before a Justice of the Peace at a fee of 10*s*. 6*d*. A fee of not less than £1 1*s*. is charged if a representative is required to attend in Court in Edinburgh to swear to the correctness of the extracts supplied.

Professor Sampson raised the question of the possibility of securing day by day in Edinburgh by telegraph from the Meteorological Office a statement of the latest information regarding the distribution of pressure over the area covered by the Daily Weather Report. He was requested to prepare a memorandum on the subject.

Dr. Shaw stated that he was keeping in view the possibility of having the Office put on the Stationery Office list.

502. Director's Report and Accounts :—

University Lectures.—Reported—that in connexion with the University of London, the Director had arranged to hold a course of nine lectures with practical work in dynamical meteorology, on Fridays, 3–5 p.m. ; and that the course had commenced on January 22nd.

Discussions at the Office.—Reported—that the fortnightly meetings for the informal discussion of important contributions to Meteorological Literature had been held in the Office on alternate Mondays at 5 p.m. from 26th October, 1914, to 7th December, and that the meetings had been resumed on 11th January, 1915, and would be continued till 22nd March.

Reports of Work.—0. *Library, Réseau Mondial and Technical Inquiries* (*November*)—Library.—Current work.—29 authors' cards and 4 cross reference cards prepared. 100 books borrowed by Office Staff. 134 volumes prepared and sent to binders.

Number of Publications received.—357.

Inquiries.—Personal, 21 ; letter, 34.

Receipts for Inquiries.—£3.

Miscellaneous.—Part preparation of Meteorological Data for African Pilot, Part II. for the Admiralty.

Réseau Mondial.—Copying of data for 1911 completed ; checking and preparation of averages completed as far as Zone 6.

Foreign and Colonial Returns.—61 manuscript returns received from Foreign and Colonial Stations.

Inquiry Assistants.—Miss Smith.—Preparation of Calendar for 1915 and correcting Proof. Translating and summarizing parts of Drygalski's "Greenland Expedition" for Captain Hepworth. Preparation of data for East African Pilot, Part II. Copying data for January, 1911, for Zones 3 and 4 of Réseau Mondial.

Miss Turney.—Preparation of lantern slides for Director, Mr. Whipple, Dr. Chree, Mr. Mossman, Mr. Watt. Preparation of Roll Calendar for December, litho-transfers for Monthly Weather Report for October and various Diagrams. Revising maps of stations.

(December).—Library.—Current work.—22 authors' cards and 2 cross reference cards prepared. 76 books borrowed by Office Staff. Daily Weather Reports for parts of 1914, for Argentine, Sweden, Norway, Hungary, Belgium and Russia, sorted for binding.

Number of Publications received —595.

Inquiries.—Personal, 35 ; letter, 28.

Receipts for Inquiries.—£3 1*s*. 2*d*.

Miscellaneous.—Part preparation of Meteorological Data for African Pilot, Part II., for the Admiralty.

Réseau Mondial.—Checking of data for 1911 and preparation of averages proceeded with. Lustrum average forms prepared for Yola, Kontagora, Sokoto and Grenada, and partially prepared for Gibraltar.

Colonial and Foreign Returns.—110 manuscript returns received.

Inquiry Assistants.—Miss Smith.—Correcting revise of Calendar for 1915. Summarizing two sections of Drygalski's "Greenland Expedition" for Captain Hepworth. Preparation of data for East African Pilot, Part II. Preparation of Mean Monthly Pressures at Valencia, Aberdeen, Falmouth and Kew, for January, February, July and August (M.O. 4593/W.09).

Miss Turney.—Preparation of lantern slides for Mr. Whipple and Mr. Dines and slides for MO., from Dr. Chree's diagrams. Printing, mounting and framing cloud photographs. Preparation of Roll Calendar for January, litho-transfers for Monthly Weather Report for November and various diagrams and forms.

Publications.—Report for November and December, 1914, from Clerk of Publications :—

—	November.		December.	
	Received.	Issued.	Received.	Issued.
Daily Weather Report ...	750	About 560*	750	594*
Weekly Weather Report ...	375	318*	375	319*
Monthly Weather Report ...	600	482*	600	481*
Do. do. (Maps)	25	2	25	2
Daily Readings	75 (Sept.)	50 (Sept.)*	75 (Oct.)	49* (Oct.)
Geophysical Journal, 1913 ...	150 (Nov.)	117 (Nov.)*	—	—
Hourly Values — Meteorological, 1913 :—Kew ...	300 (Sept.)	12 (Sept.)	300 (Oct.)	12 (Oct.)
Eskdale ...	300 („)	12 („)	300 („)	12 („)
Valencia ...	300 (Oct.)	12 („)	300 (Nov.)	12 („)
Monthly Meteorological Charts (Atlantic).	600 monthly to Dec. (3).	504*	600 monthly to Jan. (3).	465*
Monthly Meteorological Charts (Indian).	—	202*	350 (Jan.)	230*
International Upper Air Observations, 1912.	—	—	—	—
Ninth Annual Report ...	—	2	—	2
Observer's Handbook (1914)	100	2	—	41
"Forecasting Weather" ...	—	—	—	1
Cloud Atlas	—	—	—	1
Calendar, 1915	—	—	500	498
Structure of the Atmosphere.	—	—	—	—
Seaman's Handbook ...	—	2	—	73
Report on Work of s.s. "Scotia" (2 vols).	—	281*	—	1
Geophysical Memoirs, No. 1	—	7	—	3
No. 2	—	6	—	1
No. 3	—	6	—	1
No. 4	—	6	—	1
No. 5	—	8	—	—
No. 6	—	6	—	—
No. 7	—	6	—	—
No. 8	—	6	—	1
No. 9	—	280*	—	1
No. 10	—	280*	—	2
Geophysical Memoirs, Title Page, Index, &c. to Vol. I.	600	280*	—	1
Geophysical Memoirs Prospectus of Vol. I.	500	50	—	—

* Issue restricted on account of War conditions.

Receipts from sales at M.O.—11*s.* 6*d.* (November), £2 7*s.* (December).

New Publications.—(November).—Geophysical Memoirs, Volume I.—Title Page, Index and Table of Contents received from printer and general issue made with Memoirs Nos. 9 and 10 received previously. This completes Volume I. (Nos. 1–10). Copies of the Prospectus of Volume I. were also received from the printer and 50 copies issued.

Observers' Handbook.—Copies of the 1914 edition received.

New Publications.—(December).—Copies of Calendar for 1915 and Circular 001 (1915 edition) received and general issue made, and issue made of 1914 edition of Observer's Handbook.

Seaman's Handbook.—60 copies, specially bound and lettered, received and distributed to a selection of Fishery Barometer Stations.

Geophysical Memoirs, No. 11, signed for press.

1. *Marine Division* (November).—Logs and Registers.—Dealt with on receipt 19 Meteorological Logs, and 1 Lighthouse Register ; also 70 North Atlantic Registers, 4 Radio-telegraphy Registers, and 5 Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic.—The issue for December, 1914, published ; the issue for January, 1915, in course of preparation.

Monthly Meteorological Charts of the Indian Ocean.—The issue for January, 1915, published ; the issue for February in course of preparation.

Monthly Meteorological Charts of Baffin Bay and Davis Strait.—Six wind charts sent for final revise ; and six charts of sea temperature and pressure, and three charts showing current, for first proof.

Extracting and Tabulating Data for Load Line Committee relative to Gales in the North Atlantic.—Completed for two years, 1909–10 and 1908–9. Data for 1907–8 commenced.

Corrections for Barometers obtained in connexion with :—

(1) Reports by Radio-telegraphy 6
(2) North Atlantic Registers 0
(3) Indian Ocean Registers 0

Observational Duties.—Time occupied 26 hours.

Indexing in ocean 10° squares.—From log 14804 to log 14854.

Notices of Ice sent to "Shipping Gazette."—On 7 days.

Notices of Ice sent to Lloyd's List.—On 7 days.

Marine Observer's Handbook.—Revise corrected and now ready for press.

(December).—Logs and Registers.—Dealt with on receipt 19 Meteorological Logs, also 61 North Atlantic Registers, 4 Radio-telegraphy Registers, and 7 Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic.—The issue for January, 1915, published ; the issue for February, 1915, in course of preparation.

Monthly Meteorological Charts of the Indian Ocean.—Issue for February, 1915, published ; the issue for March in course of preparation.

Monthly Meteorological Charts of Baffin Bay and Davis Strait.—Examined revise of black stone, six months.

Extracting and Tabulating Data for Load Line Committee relative to Gales in the North Atlantic. Completed 1907–8 and commenced 1906–7, 1905–6. Number of years completed up to 31st December, 7.

Corrections for Barometers obtained in connexion with :—

(1) Reports by Radio-telegraphy 11
(2) North Atlantic Registers 3
(3) Indian Ocean Registers 0

Observational Duties.—Time occupied 9 hours.

Marine Observer's Handbook.—Preparing index and examining final revise.

2. *Forecast Division* (Central Office, November).—(1) The work of the Division has been carried on with the same restrictions and extensions indicated in the report for October. It has been kept up to date as far as circumstances permit.

(2) Supply of Information to H.M. Services.—The following additional information has been asked for and supplied :—

(*a*) To the First Lord of the Admiralty a forecast telegram giving the probable direction of the wind and the probability of fog over the south of the North Sea and Channel, sent twice a day, morning and evening.

(*b*) To the First Sea Lord and other permanent officials a statement showing the state of the weather off the coasts of the British Isles at 7 a.m. each morning. This is sent by special messenger to reach the Admiralty by 9.30 a.m.

(*c*) Forecast telegrams, as to Aviation Stations, have been supplied to the Officer Superintending Aircraft, Sheerness, and to the Anti-aircraft Department of the Admiralty.

(3) Wireless reports received from :—

(1) H.M. Ships... ... ... None.
(2) Mercantile Marine 5
Number of Wireless reports received in time for inclusion in Daily Weather Report on 7 a.m. Map 1
Do. do. on 7 a.m. or 6 p.m. Map of "yesterday" 1

(4) Wind Frequency Results extracted to middle of September.

(5) Working Charts prepared for binding up to end of July.

(6) Checking of 8.30 p.m. Forecasts.—Completed up to end of April and also for June. The checking for May is almost completed.

(7) Storm Warning Checking completed :—

Anemometer Results to end of July.
English Lighthouses to end of October.
English Lightships to middle of October.
Scottish Lighthouses to end of September.
Irish Lighthouses to end of September.

(8) Issue of Daily Weather Report.—Arrangements have been made for the supervision by a classified clerk attached to the Division of the operation of folding and preparing for post of the Daily Weather Report.

(9) Staff.—Mr. Goldie, who had been at the Meteorological Office from October 8th, returned to Falmouth on November 27th. During his stay at the Meteorological Office he took occasional duty as forecaster-in-charge, and also took charge of the 3 a.m. work on occasions.

Mr. Brodie returned from Falmouth to duty at the Meteorological Office on November 10th.

(Branch Office at Farnborough, November).—The regular observational and forecasting work has been carried on as in the previous month. Since the 9th the evening telegrams from the Meteorological Office, London, have been transmitted from Marlborough Lines post office by telephone in place of by hand. The time saved by this means has enabled the map and forecast to be completed fully half an hour earlier than previously.

Mr. Dines has attended at the Meteorological Office, London, for 10 nights for the early morning forecast work.

17 single theodolite pilot balloon ascents have been made during the month at South Farnborough and 3 at the Meteorological Office, London.

Mr. Dines spent two days at Benson Observatory with Mr. H. S. Allnutt superintending the erection of an anemometer at that station.

Mr. Dines has commenced an investigation with a view to tracing the cause of the irregularities which frequently occur in the pressure readings reported from Dungeness.

During the month the outsides of the two thermometer screens have been painted.

The regular analysis work has been continued as usual.

Mr. Billett has corrected the proof of his report on the South Wales tornado of October 27th, 1913.

(Falmouth Observatory, November).—Routine Work.—Monthly Return (Form 355). Completed and checked for October (two copies); November in hand.

Tabulation of :—

Barograms (Form 402). Tabulation for comparison with eye readings.

Hourly Values of Rainfall (Form 430)
Hourly Values of Sunshine (Form 403)
Falmouth Robinson Anemograms (Form 401)
Scilly Robinson Anemograms (Form 401)
} Completed and checked for October; November in hand.

Falmouth Record of Wind Direction (Form 224)
Scilly Record of Wind Direction (Form 224)
} Completed and checked for October.

Plymouth P.T. Anemograms (Form 430). Completed and checked for October; November in hand.

Analysis of :—

Pendennis Pressure Tube Anemograms (Form 339)
Scilly Pressure Tube Anemograms (Form 339)
Plymouth " " "
} Up to date.

No pilot balloon ascents.

Monthly Reports to County Council and British Rainfall Organization.

Mr. Brodie left Falmouth on 9th November.

Mr. Goldie returned to the Observatory on 27th November.

(Central Office, December).—(1) The work of the Division has been carried on with the restrictions indicated in the reports for October and November. It has been kept up to date as far as circumstances permit.

(2) Supply of information to the Services.—Reports, forecasts and maps have been supplied regularly as set out in section (6) of the report for October and section (2) of the report for November. At the end of the month the special reports to the Meteorological Officer of the Air Department at Hoo were discontinued in consequence of the transfer of that Officer from Hoo. The changes made in the supply of information to the Branch Office at South Farnborough are referred to in the Report of that Office.

Arrangements were made during the Christmas holidays to issue manifold copies of the morning map and forecasts to addresses to which a current copy of the Daily Weather Report is sent at the request of the Admiralty. This arrangement will in future be carried out regularly on Sunday mornings.

(3) Wireless Reports received from :—

(1) H.M. Ships ... ... None
(2) The Mercantile Marine 6

The latter reports were from ships sailing under the American Flag.

(4) Wind Frequency Results extracted to middle of September.

(5) Working Charts prepared for binding up to 21st August.

(6) Checking of 8.30 p.m. Forecasts completed up to end of July, and also for the month of September.

(7) Storm Warning checking completed :—

Anemometer stations to end of October.
English lighthouses to end of November.
English lightships to middle of October.
Scottish lighthouses to end of October.
Irish lighthouses to end of November.

(8) Issue of Daily Weather Report.—The arrangements described in the last report for supervising the making up of the Daily Weather Report for postage have worked smoothly. Towards the end of the month arrangements were made with the Stationery Office for preparing the envelopes for the Daily Weather Report by addressograph. The scheme is being brought into operation gradually from January 1st, as the stock of printed envelopes is used up.

The arrangements are being carried out by Miss Skipton under the direction of the Superintendent. Incidentally they involve the preparation of a card catalogue of recipients of the report.

(9) Staff.—The increase in the Sunday morning work referred to under (2) has rendered necessary the attendance of an additional assistant on Sunday mornings.

(Branch Office at Farnborough, December).—After consultation with the Officer in Command of the Naval Airship Section, the telegraphic supply of information from the Meteorological Office for drawing an evening map was discontinued from the 19th of the month as, under the existing war conditions, the foreign information is so incomplete that the map loses much of its value. Arrangements have been made to send instead an advance copy of the morning map. This is sent by express railway letter and reaches South Farnborough by about 1 p.m.

The transmission of forecasts received from the Meteorological Office, London, to the Officer Commanding, Headquarters, R.F.C., has been continued.

The regular observing work has been continued as previously.

The Meteorologist in Charge has attended at the Meteorological Office, London on 17 nights to carry out the 3 a.m. forecast work.

17 single theodolite pilot balloon ascents have been made.

A diagram has been prepared at the request of the Admiralty to enable the density of air to be read off without calculation, the pressure and temperature conditions being known.

A commencement has been made of a discussion of the horizontal temperature gradients deduced from the series of pilot balloon ascents carried out at South Farnborough during the past year.

The investigation into the apparent errors in the Dungeness pressure readings, to which reference was made in the last report, has been concluded.

The regular analysis work has been kept up to date.

(Falmouth Observatory, December).—Routine work.—Monthly Return (Form 355) (two copies) completed and checked for November ; December in hand.

Tabulation of :—

Barograms (Form 402) tabulation up to date for comparison with eye readings.
Hourly Values of Rainfall (Form 430)
Hourly Values of Sunshine (Form 403)
Falmouth Robinson Anemograms (Form 401)
Scilly Robinson Anemograms ,, ,,
} Completed and checked for November ; December in hand.
Falmouth Record of Wind Direction (Form 224)
Scilly Record of Wind Direction ,, ,,
} completed and checked for November.
Plymouth P.T. Anemograms (Form 430) completed and checked for November ; December in hand.

Analysis of :—

Pendennis Pressure Tube Anemograms (Form 339)
Scilly Pressure Tube Anemograms ,, ,,
Plymouth Do. ,, ,,
} up to date.

Four pilot balloon ascents. Monthly reports to County Council and British Rainfall Organization.

3. *Statistical Division* (November).—British Meteorological and Magnetic Year Book.—(1) Weekly Weather Report :—Current issues (Nos. 43 to 47) except the charts, which will be issued as soon as the necessary data have been received. Appendix I., 3rd Quarter, 1914, issued. Maps and letterpress revised for Appendix IV., 1913. (Monthly Normals.)

(2) Monthly Weather Report.—October issued.

(3) (i) Daily Readings.—September, 1914, issued.
(ii) Geophysical Journal.—November, 1913, issued.

(4) Hourly Readings, 1913.—Valencia.—Copy for November sent to printer.
Kew.—September issued ; October signed for press ; copy for November sent to printer.
Eskdalemuir.—Copy for October and November sent to printer ; October corrected proof sent to Eskdalemuir.
Aberdeen.—No progress.

Anemograms.—Pressure-tube anemograms from 15 stations analysed, and from four stations tabulated, up to 28th November. In addition to these four stations were analysed at South Farnborough and three at Falmouth. The Eskdalemuir records were analysed and tabulated at the Observatory. Robinson cup anemograms from five stations were tabulated up to 28th November. In addition to these the records from two stations were tabulated at Falmouth.

Sunshine Cards.—The cards from 78 stations for October were examined and returned with a comparison of the estimated duration of sunshine made by the observer with that made in the Office. The cards from 124 stations were examined and filed in the Office.

Aneroidograms.—Form 531 from 30 stations, and Form 533 from 15 stations filed up to date.

Thermograms.—Form 542 from one station, Forms 547 and 548 from six stations, and Form 549 from one station, filed up to date.

Miscellaneous.—Rain curves and hyetograms from seven stations, microbarograms from two stations, radiograms from one station, and hygrograms from three stations, filed up to date.

Rainfall returns from 94 stations entered on Summary Sheet (Form 372).

The Fleetwood anemograph tabulations for October, and Holyhead anemograph tabulations for November, were copied and sent to the usual recipients.

The sunshine cards for October from Bath and Balruddery were tabulated for use in the October Monthly Weather Report.

During the first fortnight while the returns from Telegraphic Reporting Stations were retained in Division 2, Messrs. Simpkins and Pycock were occupied with figures for the "Seasons in the British Isles."

(December).—(1) Weekly Weather Report.—Current issues (Nos. 48 to 51) except the charts, which will be issued as soon as the necessary data have been received. Some advance made with Seasonal Averages. Arrangements are in progress for the publication of rainfall in millimetres, for the omission of the values of accumulated temperature for individual stations, and for the omission of a number of stations not used for the preparation of District Values.

(2) Monthly Weather Report.—November issued after Christmas.

(3) (i) Daily Readings.—October, 1914, issued.
(ii) Geophysical Journal.—None issued.

(4) Hourly Readings, 1913.—Valencia.—November signed for press; copy for December sent to printer.

Kew.—November signed for press; copy for December sent to printer.

Eskdalemuir.—October issued; November proof corrected; copy for December in hand.

Aberdeen.—Hourly sums and means of pressure and temperature worked for October, November and December.

Anemograms.—Pressure-tube anemograms from 15 stations analysed, and from four stations tabulated, up to 26th December. In addition to these, four stations were analysed at South Farnborough and three at Falmouth. The Eskdalemuir records were analysed and tabulated at the Observatory. Robinson cup anemograms from five stations were tabulated up to 26th December. In addition to these the records from two stations were tabulated at Falmouth.

Sunshine Cards.—The cards from 36 stations for November were examined and returned with a comparison of the estimated duration of sunshine made by the Observer with that made in the Office. The cards from 124 stations were examined and filed in the Office.

Aneroidograms.—Form 531 from 30 stations, and Form 533 from 15 stations, filed up to date.

Thermograms.—Form 542 from one station, Forms 547 and 548 from six stations, and Form 549 from one station, filed up to date.

Miscellaneous.—Rain curves and hyetograms from seven stations, microbarograms from two stations, radiograms from one station, and hygrograms from three stations, filed up to date.

Rainfall returns from 86 stations entered on Summary Sheet (Form 372).

The Fleetwood anemograph tabulations for November, and Holyhead anemograph tabulations for December were copied and sent to the usual recipients. The Dover pressure-tube curves for 24–26th November, 1914, were tabulated for an Inquiry.

The Sunshine Cards for November from Bath and Balruddery were tabulated for use in the November Monthly Weather Report.

Further time has been spent on the proof of the "Monthly Normals," Appendix IV. Discrepancies existed between the averages for the observatories in this and in Part IV. of the Year Book. The values have now been adjusted.

The first six months of the Magnetic Tabulations for 1913 for Part IV., Section 2, have been sent to press, and proofs received. These are now being corrected and altered to meet the criticisms raised.

Provision has been made in the new forms for climatological returns for entries of rainfall in millimetres, and for entries twice a day. A new form of pocket register for use at Observatories has been devised in consultation with Mr. Richardson.

4. *Instruments Division* (November and December).—During this period instruments were sent to the various Dockyards to cover the deficiencies shown in the returns for September 30th. It may be noted that the numbers required were not abnormal. Special requisitions for Scapa, Liverpool, and Thorshavn were also met.

Supplies were sent to the Agents at Hull, Liverpool, and South Shields. Eight Steamships and three Light Vessels were provided with instruments directly.

At the request of the Board of Trade, the barometers used in the Offices of the Examiners of Masters and Mates are to be regraduated in millibars. Six instruments are being lent by this Office whilst the Board of Trade barometers are being dealt with in turn.

Six cones for Storm Warning Stations were issued, two of these being sold.

Earth thermometers on the Absolute Scale as well as a Besson Nephoscope have been supplied to Kew Observatory. A large barograph was sent to Valencia for use at the Cable Station. The usual outfit of a climatological station including hygrograph and thermograph has been installed at Benson.

Eighteen small requisitions from observers were met as well as seven from the Colonies.

A large eidograph has been lent to the Royal Geographical Society and Station barometers to the municipal observers at Newquay and Bath.

Observatories.—Kew (November).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual and the ordinary meteorological data have been sent weekly to the Office. The following absolute observations have been made :—

Magnetic	Declination	7	
	Horizontal Force	5	
	Inclination	5	
Potential gradient	on	22	days.
Wilson apparatus	,,	14	,,
Ebert ,, ...	,,	14	,,
Pyrheliometer...	,,	8	,,

International cloud observations were made on four days.

A scale observation was made of the electrograph, and the two Kelvin portable electrometers were compared at the National Physical Laboratory and intercompared subsequently at the Observatory.

The comparison of the Cooke Unifilar magnetometer No. 26 was concluded, and reports embodying the results were made to the Director and to the Superintendent U.S. Coast and Geodetic Survey.

An analysis of the special observations and curve measurements made in connection with the solar eclipse on August 21st was prepared and sent to Dr. L. A. Bauer and to Mr. Carlheim Gyllensköld who had applied for information of the kind.

The Benndorff electrograph has been removed from its position in the north hall and re-erected in the electrical room outside. The level belonging to the barometer cathetometer slipped down and was broken. It has been satisfactorily repaired by Mr. R. W. Munro. The gas engine has ceased to work in spite of a good many fruitless attempts. It was inspected by a representative of the makers. There has been some trouble with the gas supply which seems hardly equal to all the demands now made on it. Alterations, approved by the Director, have been made to the paths in the garden.

(December).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual and the ordinary meteorological data have been sent weekly to the Office. The following absolute observations have been made :—

H., D. and I.	4 occasions each.	
Potential gradient	on	16 days.
Wilson apparatus	„	8 „
Ebert „	„	8 „
Pyrheliometer	„	3 „

Three scale value determinations have been made of the electrograph and an intercomparison of the two portable electrometers.

Records ceased to be taken with the Dines Pressure Tube anemograph near the Park entrance on November 30th.

A number of dip observations have been made with two new dip circles by Dover (Nos. 241 and 242), each provided with eight needles.

Complaints having been made to the Richmond Gas Company about the insufficiency and variability of the gas pressure, their engineer made attempts to improve the pressure by removing obstructions from the gas pipes across the park. These attempts, which led to no very marked improvement, occasioned on several days a considerable loss of trace, though the arrangements made to secure records at each hour G.M.T. were successful.

The " handyman " H. Willmott has enlisted in the army.

The extension of the terrace and alterations to the paths in the garden have been completed, and " breeze " from the gas works and gravel are being laid on the short new roadway to the east of the " workshop."

Eskdale (November).—Staff.—Total leave of absence amounts to 4½ person-days. James Graham has continued as a temporary Boy Clerk.

The office staff have been putting in overtime in order to forward the annual magnetic tabulations for 1913.

Mr. John Woodrow, from Paisley Observatory, has been here as an honorary assistant since 6th.

The underground magnet house is noticeably drier. Eight litres of water were removed from the trench between November 1st and 26th. This is clearly less than the corresponding amount for October, although the rainfall in November has been much greater. The porch feels dry and the calcium chloride placed in it has almost ceased to absorb water. The skirting boards of E. and W. rooms are still wet in places.

The temperature to-day (November 28th) is 12·4° C., as compared with 10·75° C. on the same date last year. The wicks of lamps are henceforth to be kept turned up as much as possible.

Magnetics.—The tabulations for 1913 are near completion.

The tabulations of the current year are in the following state :—

——	N.	W.	V.
Read once	To date	October 5th	To date.
Read twice	„	August	September 16th.
Individual bases	May	May	April.
Smoothed bases	March	March	Not yet.
Monthly sheets finished	March	January	„

An instrument is being constructed for testing brass and other materials for magnetism.

Preparations are being made to perfect the drying of the insides of the magnetograph cases.

Meteorology.—The usual observations and tabulations have been continued. About November 20th it became too dark to follow a balloon at 7h. 15m. Eleven observations of solar radiation have been made.

The Beckley rain-gauge has been giving wrong results in heavy rain and some experiments with it are in progress.

Atmospheric Electricity.—Tabulations finished up to October, 1914, except the picking out of the times of largest disturbances.

Ebert observations 12 days.

Four pit observations on three days.

Need is felt for a better standard of voltage.

Seismology.—Remains in much the same state as last month.

(December).—Staff.—James Graham, temporary Boy Clerk, left on 19th, when the 1913 tabulations were finished. David Black is spending a fortnight at the observatory as a temporary Boy Clerk, with reference to the future post office.

Mr. Dines has been on leave for about a fortnight.

The Underground Magnet House.—64 litres of water were removed from the trench between November 26th and December 30th. There is clear evidence that a leak in the asphalt floor developed on or about December 18th. A report of the evidence has been sent to the Office of Works and a copy to the Meteorological Office (Reference CE20, December 26th). This morning Mr. Stonier has actually seen the water welling up at two places. In spite of the inflow of water the rooms feel decidedly drier than they did in August when moisture was condensing from the air.

Magnetism.—The cases of the N. and W. magnetographs have been rendered proof against the wettest of external atmospheres. Any air entering must first pass through a tube filled with drying agent. Precautions are taken against formation of jets of air which might disturb the instrument. The Adie V.F. balance is being protected in a similar way. The N. and W. magnets were found to be very rusty and were not cleaned.

An instrument for testing the magnetism of brass or of complete brass instruments has been designed by the Superintendent and made by Mr. Stonier.

The last of the magnetic tabulations for 1913 were posted to the Office on 19th. A letter describing the classification of magnetic disturbances at Eskdalemuir appeared in "Nature" on 24th.

A diagram has been prepared giving $\log (1 + P/25^2 + Q/25^4)$ as a function of the differences between $\log \frac{m^1}{H^1}$ at the three distances 25, 30, 35 cms. It can be read to an accuracy corresponding to 1/6 γ.

The tabulations for the current year are in the following state :—

——	N.	W.	V.
Read once	December 7th	December	December 12th.
Read twice	November 26th	August	October 4th.
Converted to γ and checked ...	July	June	September 30th.
Log $(1 + P/r^2 + Q/r^4)$	August	—	—
Monthly sheets finished	March	March	Not yet.

Five observations have been made of declination and horizontal force and four of dip by the inductor.

Meteorology.—The usual observations and tabulations have been continued.

Four observations of balloons and five of solar radiation have been made.

A note on local winds has been sent to the forecast division.

Atmospheric electricity.—Five observations have been made by the Ebert apparatus.

The tabulations for the current year are in the following state :—

Curves read to December.
Monthly sheets finished, August.
Times of large disturbances, under consideration.

Seismology.—A specimen of a new type of seismogram was received from Mr. J. J. Shaw through the Office. It has been examined and reported upon. The tabulations are done up to the end of June.

Accounts.—Submitted—a list of outstanding accounts (small debtors) relating to the period 1908 to February, 1914, amounting to £6 12*s.* 9*d.*

It was agreed that the accounts be written off the books as irrecoverable.

Submitted—The following statement of the Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on 24th November, 1914	4,226	7	0
Receipts from 25th November, 1914, to 26th January, 1915 ...	6,127	14	11
	10,354	1	11
Cheques drawn from 25th November, 1914, to 26th January, 1915	4,750	17	5
Balance on 26th January, 1915	5,603	4	6

Submitted—The following Statement of Accounts for the Nine Months ending 31st December, 1914:—

RECEIPTS.						PAYMENTS.				
1913.				1914.	1913.					1914.
£ s. d.		£ s. d.		£ s. d.	£ s. d.		£ s. d.			£ s. d.
95 17 9	Balance from year 1913–14	—		1,250 16 8	750 0 0	Director...	—			750 0 0
15,000 0 0	Parliamentary vote .	—		15,000 0 0		OFFICE SALARIES (including Insurance):				
					6,121 8 11	Monthly	6,092 8 10			
	DEPARTMENTAL EXPENSES REPAID:				735 9 10	Weekly	834 18 3			6,927 7 1
124 18 9	Forecasts, &c. ...	89 4 0				EXPENSES OF OFFICE:				
83 5 4	Marine, Statistical, and Administrative	49 10 10			516 17 1	Rent, Heating, and Lighting	513 4 0			
38 19 5	Instruments ...	64 15 3			295 9 2	Furniture and Equipment	18 12 5			
				203 10 1		Library	38 12 0			
	INCIDENTAL EXPENSES REPAID:					Insurances, Repairs, Incidental Expenses, and Consumable Stores ...	180 2 9			
330 11 3	D.W. Report ...	244 10 2			316 16 10					750 11 2
74 17 1	Divisional... ...	59 18 9				POST OFFICE:				
—	Advertising Account	8 2 0				Postage	590 6 2			
				312 10 11	520 4 3	Telephones	81 10 7			
40 9 9	STATIONERY OFFICE	—		70 8 6	—	Telegrams	1,832 0 10			
					1,772 15 7					2,503 17 7
721 1 6	TELEGRAPH CHARGES REPAID	—		511 7 1	—	STATIONERY OFFICE ..	—			47 8 10
	TELEPHONE				400 17 5	TRAVELLING EXPENSES	—			251 10 7
—	CHARGES REPAID	—		8 8 7		SUPERANNUATION:				
182 13 0	INSPECTIONS ...	—		164 13 0	621 19 0	Funded annuities ...	716 8 4			
						Non-funded pensions	418 8 0			
	INSTRUMENTS:				1,010 4 9	Contribution to fund	541 0 0			
2 2 6	Royal Navy ...	20 4 6								1,675 16 4
1,610 5 7	Mercantile Marine, Stations, &c. ...	1,949 15 10			759 6 6	COST OF INSTRUMENTS: Royal Navy	262 18 6			
				1,970 0 4	1,675 18 5	Mercantile Marine, Stations, &c. ...	2,398 18 3			
	SUPERANNUATION ACCOUNT:									2,661 16 9
589 4 6	Annuities... ...	688 1 0				*OBSERVATORIES, BRANCHES, AND STATIONS:				
20 15 6	Interest on Investment	9 12 10			1,398 9 8	Kew	2,025 0 5			
				697 13 10	1,375 4 2	Eskdale	1,127 13 1			
	*OBSERVATORIES, BRANCHES, AND STATIONS:				437 14 11	Valencia	423 2 7			
					358 9 9	Farnborough	464 3 6			
404 16 1	Kew	363 13 0			—	Falmouth	119 3 4			
1,300 6 1	Eskdale	1,015 16 0			—	Benson (net expenditure)	429 13 8			
30 15 5	Valencia	23 16 8			1,775 14 8	Miscellaneous ...	1,315 10 9			
250 0 0	Farnborough ...	299 4 9								5,904 7 4
—	Falmouth... ...	4 14 5				LECTURES AND EXPERIMENTS ...	200 0 0			
81 18 5	Miscellaneous ...	72 18 10			68 13 4	Less refund ...	43 15 0			
				1,780 3 8						156 5 0
85 12 6	LECTURES AND EXPERIMENTS ...	—		236 17 6		BALANCE:				
					301 18 3	Cash at Bank... ...	503 18 2			
	FURNITURE, FITTINGS, &c. ...				41 9 5	,, at Office ...	73 11 4			
186 11 6		—		—						577 9 6
£21,255 1 11				£22,206 10 2	£21,255 1 11					£22,206 10 2

* For details, *see* separate statement.

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
2,712 17 4	To sundry creditors	2,019 12 2		343 7 8	By cash at Bank and at Office ...	577 9 6	
17 7 3	,, salaries reserved	16 18 5		478 17 9	,, M.O. instruments in stock	215 9 0	
117 19 8	,, balance	104 8 1		1,058 9 10	,, sundry debtors	982 3 10	
				832 4 0	,, Admiralty	365 16 4	
				135 5 0	,, superannuation	—	
£2,848 4 3		£2,140 18 8		£2,848 4 3		£2,140 18 8	

NOTE.—(1) On 31st December the amount of 2½ per cent. Annuities held for the provision of Superannuation Annuities was £81 18*s.* 4*d.*
(2) These accounts are subject to audit by the Comptroller and Auditor-General.

Observatories.—Statement of Accounts for the Nine Months ended 31st December, 1914 :—

KEW.

1913.	*Receipts.*		1914.	1913.	*Payments.*		1914.
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
351 2 10	Subvention, Scott Antarctic Fund	123 0 0			Salaries, Scheduled	1,143 2 6	
	Gassiot Trust	154 1 6		1,060 5 2	Sunday and holiday duty	17 7 7	
			277 1 6		Extra Assistance ...	58 10 6	
5 0 0	Expenses refunded locally ...		4 11 0				1,219 0 7
32 10 3	Tests and Commissions		68 9 6				
16 3 0	Cost of books and forms refunded		13 11 0	—	Cost of forms, &c.		22 6 7
993 13 7	Balance		1,661 7 5	156 14 11	Rent, Rates, Taxes, Repairs and Insurance		488 17 3
				64 5 1	Fuel and lighting		54 4 9
				20 5 4	Equipment and instruments ...		180 9 7
				23 16 3	Consumable stores		9 12 4
				71 1 5	Incidental expenses		12 4 9
				2 1 6	Books, &c.		4 19 7
				—	Postage, telephones and telegrams		31 12 9
				—	Travelling expenses		1 12 3
£1,398 9 8			£2,025 0 5	£1,398 9 8			£2,025 0 5

ESKDALE.

1913.		1914.	1913.		1914.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
1,297 12 1	Subvention, Royal Society ...	1,000 0 0	773 8 0	Salaries, Scheduled	770 1 10
2 14 0	Expenses refunded locally ...	15 16 0	52 0 11	Cost of forms, &c.	40 1 1
74 18 1	Balance	111 17 1	134 19 10	Rent, Rates, Taxes, Repairs and Insurance	28 14 10
			96 13 6	Fuel and lighting	146 12 6
			64 10 2	Equipments and instruments ...	31 7 2
			—	Consumable stores...	29 13 3
			49 18 6	Incidental expenses	9 6 10
			5 1 6	Books, &c.	5 5 2
			1 15 0	Postages, telephones and telegrams	28 3 10
			196 16 9	Travelling and motor car expenses	38 6 7
£1,375 4 2		£1,127 13 1	£1,375 4 2		£1,127 13 1

VALENCIA.

1913.		1914.	1913.		1914.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
13 5 5	Subventions, Rosse Fund	6 6 8	321 19 5	Salaries, Scheduled	332 8 4
17 10 0	Expenses refunded locally ...	17 10 0		Cost of forms	1 16 6
406 19 6	Balance	399 5 11		Rent, Rates, Taxes, Repairs and Insurance	63 9 4
			102 10 6	Fuel and lighting	10 16 1
				Equipment and instruments ...	7 4
				Incidental expenses	1 0 0
			13 5 0	Postages, telephones and telegrams	13 5 0
£437 14 11		£423 2 7	£437 14 11		£423 2 7

FARNBOROUGH BRANCH OFFICE.

1913.		1914.	1913.		1914.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
250 0 0	Subvention (Advisory Committee for Aeronautics)	250 0 0	256 18 1	Salaries, Scheduled	377 8 3
—	Expenses refunded locally ...	49 4 9		Rent, Rates, Taxes, Repairs and Insurance	9 9
109 1 6	Balance	164 18 9		Equipment and instruments ...	9 2 5
				Consumable stores	10 17 8
			102 3 5	Incidental expenses	5 6
				Books, &c.	1 16 2
				Postages, telephones and telegrams	42 1 7
				Travelling and motor car expenses	22 2 2
£359 1 6		£464 3 6	£359 1 6		£464 3 6

FALMOUTH WEATHER STATION.

1913.		1914.	1913.		1914.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Expenses refunded locally ...	4 14 5	—	R. Cornwall Poly. Society ...	30 0 0
—	Balance	114 8 11	—	Salaries, Scheduled	45 15 3
			—	Overtime, &c.	1 3 8
			—	Rent, Rates, Taxes, Repairs and Insurance	14 10
			—	Equipment and instruments ...	10 10 10
			—	Consumable stores	1 7
			—	Incidental expenses	13 6
			—	Postages, telephones and telegrams	20 9 0
			—	Travelling expenses	9 14 8
£ —*		£119 3 4	£ —*		£119 3 4

* 1913 figures not available.

BENSON.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	By credits for instruments supplied	16 6 0	—	Salaries, Scheduled	255 12 6
—	Balance carried to Office account	429 13 8	—	Cost of forms, &c.	5 0
			—	Overtime, &c.	4 0
			—	Equipment and instruments ...	93 8 5
			—	Consumable stores	39 18 9
			—	Incidental expenses	5 5 0
			—	Books, &c.	50 16 0
			—	Postages, telephones and telegrams	10 0
£ —*		£445 19 8	£ —*		£445 19 8

METEOROLOGICAL OFFICE, EDINBURGH.

£ s. d.		£ s. d.	£ s. d.		£ s. d
—	Balance	273 10 6	—	Subvention	262 10 6
			—	Travelling expenses	11 0 6
£ —*		£273 10 6	£ —*		£273 10 6

MISCELLANEOUS STATIONS.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
—	Cost of forms refunded	72 18 10	—	Subventions, Aberdeen, Armagh ...	258 7 6	
—	Balance	969 1 5	—	British Rainfall Organisation	12 10 0	
						270 17 6
			—	Salaries of Observers		519 6 5
			—	Overtime		13 6
			—	Cost of forms, &c.		158 16 6
			—	Rent, Rates, Taxes, Repairs and Insurance		4 6 0
			—	Equipment and instruments ..		14 3
			—	Consumable stores		1 6
			—	Incidental expenses		77 0 11
			—	Books, &c.		1 3 6
			—	Postages, telephones and telegrams		9 0 2
£ —*		£1,042 0 3	£ —*			£1,042 0 3

* 1913 figures not available.

SIXTIETH MEETING.

South Kensington, S.W., 24th March, 1915.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW. | CAPT. LYONS.
CAPT. HARVEY. | MR. MIDDLETON.

DR. SCHUSTER.

503. The Minutes (492–502) of the last Meeting (27th January, 1915) previously circulated, were taken as read, and confirmed.

504. CORRESPONDENCE.—**Great Northern Telegraph Company.**—*Iceland Messages.*—Reported—the receipt of the following letter (669/C.11) :—

The Great Northern Telegraph Co., Ltd.,
15, St. Helen's Place,
London, E.C.,
11th February, 1915.

DEAR DR. SHAW,

I AM requested by the Company's Head Office to inform you that in October last certain difficulties arose with regard to the transmission by post of the meteorological reports from Iceland and the Faroe Islands.

The Company is, however, now in a position to supply the missing reports by post for the period 3rd October–18th December, but only from Thorshavn, Seydisfjord, and perhaps Akureyri, and also the future reports until telegraphic transmission can be resumed.

Although the stoppage is due to *force majeure*, the Company does not wish to charge any subscription for the period in which the reports cannot be supplied telegraphically, but as, on the other hand, the observations presumably are of scientific interest for the Meteorological Offices, even if only received by post, the Company now makes the following proposal :—

1. The subscription to the reports is considered as suspended from 5th August, 1914, until the telegraphic transmission can be resumed.
2. During the suspension of the subscription the Company will supply the reports *by post*, unless prevented by *force majeure*, and the subscribing Meteorological Institutes undertake jointly to cover the expenses in connection with the telegraphic transmission in Iceland, the remuneration of the observers, postage, &c., which is estimated to amount to about Frs. 5,000 per annum. If, for instance, 10 Institutes subscribe, the expense will consequently be Frs. 500 per annum for each. For the period 3rd October–18th December, 1914, it will, however, only be possible to supply the reports from Thorshavn, Seydisfjord, and possibly Akureyri.

The realisation of the proposal will depend on sufficient support being obtained, and you will perhaps be good enough to inform me at your earliest convenience whether you are disposed to entertain the proposal, in order that I may telegraph to the Head Office at Copenhagen.

On hearing your decision the Head Office will send the account for the subscription for the telegraphic report from 1st July—4th August, 1914, and later on the account for the postal reports, for which the payment cannot yet be determined.

Yours very truly,
F. C. C. NIELSEN.

Dr. W. N. Shaw, Director,
Meteorological Office.

A copy of the letter was circulated to the members of the Committee on 4th March, together with an explanatory memorandum containing an outline of the action proposed. The following reply to the Great Northern Telegraph Company was sent after sufficient replies from the Committee had been received :—

DEAR MR. NIELSEN,

8th March, 1915.

I AM in receipt of your letter A.329 of 11th February regarding the arrangements for meteorological reports from Iceland and Faroe, and have consulted the Meteorological Committee about the proposals made by the Great Northern Telegraph Company.

This Office will be glad to receive the reports by post as suggested in your letter and will undertake its share of the expenses. If, however, the other Institutes do not approve your proposal with the consequence that the whole expense, estimated at 5,000 Frs. per annum, has to be borne by this Office, the Committee wish to reserve the right to reconsider their position in the matter.

Yours faithfully,
W. N. SHAW.

F. C. C. Nielsen, Esq.,
The Great Northern Telegraph Co., Ltd.,
15, St. Helen's Place, E.C.

Development Commission.—*Application from the British Rainfall Organization.*—Read—letter 1069/O.503 dated 9th March, 1915, from the Development Commission forwarding (1) a copy of an application to the Treasury, dated 5th November, 1913, by the British Rainfall Organization for an annual grant of £750 and a block grant of £5,000 from the Development Fund; (2) copy of correspondence between the Treasury and the Organization as to the economic utility of the work of the Organization, and (3) a copy of a covering letter from the Board of Agriculture and Fisheries to the Development Commissioners, dated 5th February, 1915. The Board of Agriculture, in their letter, recommend that, conditionally, a grant of, say, £300 per annum might be made to the Organization mainly on the ground of the public utility of statistics of rainfall and river-flow in regard to fisheries, industry, and public health, and state that in the Board's opinion "it will be necessary to secure a connexion between the work of the Organization and that of the Meteorological Office by stipulating for the representation of the Meteorological Committee on the Organization's Board of Trustees or by similar means." They suggest that the application might be referred to the Director of the Meteorological Office and to the Director of the Geological Survey for their observations before reporting to the Treasury. The Development Commissioners have accordingly forwarded the application for observations.

A draft reply to the Development Commissioners was read, and after discussion it was agreed to modify it in certain respects, and to circulate a revised draft to the members of the Committee.

Royal Observatory, Greenwich.—*Supply of Information to the Public.*—Read—the following letter (983/O.501) from the Astronomer Royal:—

Royal Observatory, Greenwich,
London, S.E.,
3rd March, 1915.

MY DEAR SHAW,

WE have been in the habit of supplying to the Registrar-General a Weekly Meteorological Report. This was discontinued in October, but a week ago I sent him the Reports to the end of the year. At the same time I informed the Admiralty and suggested that I might be allowed to send them a fortnight late.

They did not agree to this, but said (and it seems to me a very reasonable line to take) "that during the war meteorological information should be promulgated by the Meteorological Office only. If the Registrar-General requires such information he might be requested to apply to that Department." If you hear from the Registrar-General you will know what it is all about. We have the forms all made out and can forward to you as and when required, if the Registrar-General wants them and you sanction his having them.

Yours very sincerely,
F. W. DYSON.

W. N. Shaw, Esq.

Reported—that the Registrar-General had not yet applied for the information referred to. Since the receipt of the letter the Astronomer Royal has forwarded to the Office a few inquiries which have been addressed to him from solicitors and others, with the replies thereto, and the replies have been transmitted to the inquirers by the Office after examination.

Astronomer Royal for Scotland.—*Supply of forecasts to Edinburgh by telegraph for exhibition.*—Reported—that on 5th October last a letter was received from the Astronomer Royal for Scotland making application on behalf of a new Naval Air Station at Granton on the Forth for a daily forecast of weather, to be sent to the Astronomer Royal and transmitted by him to the air station. The service was started forthwith, but on 19th October it was arranged, at the request of the Hydrographer, that the reports should be sent direct to Granton, and the telegrams to the Astronomer Royal were discontinued from that date. The Astronomer Royal has now written the following letters:—

488/C.10.

Royal Observatory,
Edinburgh,
30th January, 1915.

DEAR SHAW,

I WRITE to revive a matter which arose in conversation between us at the recent meeting of the Meteorological Committee for Edinburgh,—the question of telegraphic reports.

During the short period when the naval air station at Granton received its forecasts through the Royal Observatory, I made a point of comparing these with the local conditions at the time of receipt, and noting whether they had verified themselves in the three or four hours that had elapsed. I was much struck with their accuracy. The interest they possessed seemed to me of a different order altogether to that of the daily report which reaches us by post or the telegraphic reports of the newspapers. The former is received here 26 hours after the data are collected and the latter about 14 hours. These intervals are enough to rob the forecasts of most of their point.

I would like to ask you to consider whether arrangements could be made for telegraphing the full local forecasts to Edinburgh as soon as made up. Anything that the Royal Observatory could do in the way of facilitating this, as by receiving and making available the reports at hours when the Meteorological Office at Edinburgh was closed, I should be glad to undertake. I am aware that the expense would be considerable. Something could be done to distribute this, as by arrangements for telephoning the forecasts, at a fee, to the newspaper offices, clubs, and other bodies. The Observatory would be ready to bear its share, but my means do not allow me to promise much. At the beginning, at any rate, there would probably remain a residual expense to the Meteorological Office, against which could be set the educative value of the reports and the public service.

At present one is aware that Admiralty regulations would prevent such an arrangement from coming into force, but I am assuming that these regulations will be changed as soon as the public interest permits.

Yours very truly,
R. A. SAMPSON.

W. N. Shaw, Esq., Director,
Meteorological Office.

911/C.10.

Royal Observatory,
Edinburgh,
25th February, 1915.

DEAR SHAW,

ON receipt of the letter which you circulated through Watt, Mr. Mackay Bernard wrote to ask me what would be the cost of the proposed scheme of telegrams. I replied, about £50 a year for three per day, or £35 for two. Against this to be set receipts from the public, which could only be guessed, but which I supposed might reach £20 net. I have now received from him the letter copied overleaf most generously offering to meet any deficit up to £35, for a year at any rate. I thought you would like to know its terms at once.

Yours very truly,
R. A. SAMPSON.

Dr. W. N. Shaw, Director,
Meteorological Office.

[COPY.]

Henley Hall,
Ludlow,
24th February, 1915.

DEAR PROFESSOR SAMPSON,

MANY thanks for your letter and for the particulars you give, and I note £35 would pay the cost.

I think with you that it would be a pity if the scheme was not gone on with and tried for a year at any rate, and rather than see it stuck I will pay the £35 or any portion of it myself.

I hope circumstances will allow of its being started soon, but things abroad don't look very promising for this at present.

With kind regards,
Yours truly,
(Signed) J. MACKAY BERNARD.

Mr. Watt, Superintendent of the Edinburgh Office, being in London, was present by invitation of the Chairman. The following reply was drawn up after the meeting and despatched to the Astronomer Royal on 30th March :—

DEAR SAMPSON,

30th March, 1915.

THE Meteorological Committee had under consideration at their last meeting your letter of 30th January, regarding the possibility of arranging for the local distribution of forecasts in Edinburgh, and your further letter of the 25th February, informing me of Mr. Bernard's generous offer to meet the expenses of such an arrangement up to £35 for one year.

Mr. Watt happened to be in attendance at the Office and was interviewed by the Committee. He explained that he had no instructions in the matter, but answered various questions put to him, and informed us that the Council of the Scottish Society had appointed a small committee to consider the whole question.

The Committee are cordially in sympathy with your ideas, and would be glad to have some definite scheme for consideration which might be practicable now or later on. Any scheme must be considered from two points of view—first, as to the information to be telegraphed ; and secondly, as to the provision for the cost.

The first should be considered in the first instance without regard to the restrictions upon dissemination of information at present imposed by Government ; we may see to that later on. The information available should therefore be taken as that set out in the Daily Weather Report, which could be telegraphed at 10 a.m., and corresponding information which could be telegraphed at 8 p.m. ;

and the first point that arises is what part of that information should form the message. The general inference and forecasts for a selection of the districts seems the most easily defined, but what was sent to you and is now sent generally to the Air Service had an introductory passage on the general situation, rather better put than the "general inference" would seem to be if one had no map.

It is just possible that the proper line of development in this affair is to amplify our present exiguous 1 p.m. service of observations which is designed for gale-warnings and, in the summer, harvest forecasts. The course of events that have led up to 7 a.m. and 6 p.m. as the best hours of observations are not all of them very practical.

As regards ways and means, we must not lose sight of Mr. Bernard's offer, as you suggest. I do not quite know what is meant by the educative value of the scheme, but I have no doubt the Committee would be willing to bear some of the expense of a well-considered plan. It would be well, however, to feel our way towards some scheme that would eventually, and one would hope at an early date, become self-supporting.

I doubt if you could look for anything from the newspapers. The forecasts are available here to the press agencies without charge, and are presumably wired to the Edinburgh papers by their London offices at press charges, which are very low indeed.

The next immediate step is to see what the Committee of the Scottish Meteorological Society have to say.

Yours very truly,
W. N. SHAW.

Professor R. A. Sampson, F.R.S.,
Royal Observatory,
Edinburgh.

505. OFFICE STAFF.—**Resignations.**—Reported—that Miss Skipton had given formal notice on 28th February to terminate her appointment (Minute 495) on 31st March, and that her attention had been called to the fact that the regulations under which she was appointed provided for three months' notice.

Also—that F. L. Bristow, probationer, had left on 20th February for a premium place with Messrs. Raphael Tuck & Co.

Also—that J. Chaytow, probationer, had obtained employment as a second-division clerk in the Civil Service as from 20th March.

Scale of Pay to Probationers and Boy Clerks.—The Director reported that he had compared the rates of pay of boy clerks and probationers with that of boy clerks and assistant clerks in the Civil Service, and that the comparison was unfavourable for the Office.

It was agreed that the rate of pay to boy clerks and probationers in the London District should be increased by 2*s.* a week over that printed in Circular 002 (28th January, 1914), as from 1st April, 1915, so that the new scale will be as follows :—

For the year following his	Weekly pay to Probationer.	Weekly pay to Boy Clerk.
15th birthday	—	14*s.* 6*d.*
16th ,, ...	—	16*s.* 0*d.*
17th ,, ...	19*s.* 0*d.*	17*s.* 6*d.*
18th ,, ...	20*s.* 6*d.*	19*s.* 0*d.*
19th ,, ...	22*s.* 0*d.*	20*s.* 6*d.*
20th ,, ...	—	22*s.* 0*d.*

and that facilities should be given for attendance at evening classes or other opportunities for educational improvement.

Civil pay to absentee lift attendant.—Reported—that the lift attendant, who is in the service of the Office of Works, which recovers part of his wages from the Meteorological Office, had obtained the consent of the Office of Works to rejoin the Army, and the appropriate proportion of the civil pay now due to him is claimed from the Meteorological Office, in addition to the wages of the man who operates the lift (1009/X. 03).

It was agreed to pay the amount, and to mention at the same time to the Office of Works that there is no authority for the payment to be found in the lease.

Employers' Liability Insurance.—Reported—that in reply to an inquiry of the 25th February, 1915, in which the Companies named were asked to quote premium rates to cover the Committee against claims made by any member of the staff, the following quotations have been received :—

Company.	Reference.	Rates per cent.	Remarks.
The Alliance Assurance Co.	900/008	10*s.* over all	Tariff Company.
The County Fire Office, Ltd.	939/008	10*s.* less 15 % Comm.	Ditto.
The Employers Liability Assurance Corporation.	1010/008	Ditto	Ditto.
The Law Accident Insurance Corporation.	899/008	10*s.* less 15 % Comm. (Civil Service Insurance Society).	Tariff Company. Present policy for Kew and Farnborough with this Company.
The London Assurance Corporation.	915/008	10*s.* less 15 % Comm.	Tariff Company.
The Railway Passengers Assurance Co.	898/008	Ditto	Ditto.
The Norwich Union Life Insurance Society.	916/008	Ditto	Ditto.
The Sun Insurance Office ...	901/008	Ditto	Ditto.
The Car and General Insurance Corporation.	1112/008	4*s.* over all	Policy for Valencia held with this Company.
Messrs. Glanvill, Enthoven & Co.	902/008	Professional, Clerical and Observing Staff 2*s.* 6*d.* Mechanics, Messengers and others 5*s.*	Lloyds' policy. Present policies for Meteorological Office, Eskdale and Falmouth with this Company.

It was agreed that the insurance against employer's liability of the members of the Staff whose salaries are below £250 a year, be effected with Messrs. Glanvill, Enthoven & Co., on the terms quoted above.

Promotions for men serving with the colours.—Following the ruling laid down by the Treasury in the case of Civil Servants, it was agreed that for purposes of computing Civil pay to men serving with the colours, normal increments of salary, or changes of grade be not counted ; but that on returning to the office after military service is no longer required, the salary would be what it would have reached if they had remained in the office, including the usual increments.

Staff 1915–16.—Read—the following letter with reference to the appointment of a Superintendent of Valencia Observatory on the conditions set out in Minute 497.

Royal Society,
Burlington House,
London, W.,
22nd February, 1915.

DEAR DR. SHAW,

THE appointment of a Superintendent at Valencia Observatory to succeed Mr. Cullum on his retirement, has been, as you know, the subject of discussion by a Sub-Committee of the Gassiot Committee, which entrusted to that Sub-Committee the nomination of a suitable candidate.

I am now directed by the Chairman of the Gassiot Committee to forward you the unanimous recommendation of the Sub-Committee, which is that Mr. L. H. G. Dines, M.A., A.M.I.C.E., Senior Professional Assistant, now at Eskdalemuir Observatory, be appointed to succeed Mr. Cullum.

I am, &c.,
ROBT. HARRISON.

The following Appointments and Promotions were approved :—

Superintendent (Valencia Observatory) ...	L. H. G. Dines, M.A., A.M.I.C.E.
Senior Professional Assistant (Eskdale) ...	A. H. R. Goldie, M.A.
Transferred for Service in connexion with the Forecast Division	C. D. Stewart, B.Sc.
Resident Observer (Kew Observatory) ...	E. G. Bilham, A.R.C.Sc., B.Sc.
Professional Assistant (Benson Observatory)	E. V. Newnham, B.Sc.
Principal Staff Assistant (Instruments Division)	R. F. Wallace.
Staff Assistant	H. L. B. Tarrant.
Clerk	C. W. Heinemann.
Clerk Computer	A. E. Pycock.
" "	Miss E. V. Turney.
" "	J. B. Phillips.
" "	B. G. Brame.
Transferred for Service in the Forecast Division	C. C. Newman.

The following Ordinary Increases of Salary were approved :—

W. Allingham.	H. G. Harris.
E. L. Ardley.	W. Hayes.
A. H. Bell.	A. G. W. Howard.
T. D. Bell.	J. H. James.
A. T. Bench.	H. Keeton.
E. Boxall.	R. Sargeant.
C. E. P. Brooks, B.Sc.	J. Sheerman.
Miss D. M. Buckeridge.	A. R. Simpkins.
Miss D. G. Chambers.	P. N. Skelton.
J. S. Dines, M.A.	Miss R. E. Smith.
B. Francis.	M. T. Spence.

Special Increase on Re-organisation of Valencia.—M. Sugrue.

To date from 1st April, 1915.

The following appointments were also approved :—

As Storekeeper with a salary of £92 10*s.*, rising by annual increments of £2 10*s.* to £100, on the same terms as those for Office Keepers in Circular 002 ; to take charge of the stores of farms and to be in attendance for nine hours a day, as directed, for that purpose.—A. G. Goad.

As Assistant Office Keeper with a salary of £87 10*s.*, of which £7 10*s.* must be invested in a policy of endowment assurance in accordance with Regulation 15 of Circular 002.—C. E. Goad.

It was agreed to authorise the Assistant Office Keeper to make arrangements with the various newspapers for the delivery of the evening reports ; to collect and disburse the sums paid by the newspapers for that service, reporting from time to time the arrangements made.

The appointment of a messenger in place of C. E. Goad was referred to the Director.

506. Harvest Forecasts.—**Arrangements for 1915.**—It was agreed that a service of harvest forecasts be maintained from 1st June to 30th September, under such restrictions in regard to the information included in the forecasts as are imposed by Government.

507. Estimates for 1915–16.—Read—the following letter (574/C.06) from the Treasury, in reply to the Committee's letter printed in Minute 490 :—

27,038/14.

Treasury Chambers,
3rd February, 1915.

SIR,

I have laid before the Lords Commissioners of His Majesty's Treasury your letter of the 2nd December last (C.06), transmitting an estimate of the expenditure of the Meteorological Office for the year 1915–16.

In reply, I am to state that after careful consideration of the representations contained in your letter Their Lordships are satisfied as to the desirability of increasing the grant-in-aid and They are accordingly proposing to ask Parliament to vote an inclusive sum of £22,500 for 1915–16. This amount is less by £1,500 than that asked for in your letter (viz., £24,000 exclusive of the Eskdalemuir grant) in which *inter alia* provision was requested (1) of the sum of £550 for the purpose of strengthening the professional staff of the Marine, Statistics and Instruments Divisions, and (2) of the sum of £500 for additions to staff at Kew and Eskdalemuir. As regards the second of these proposals my Lords gather that the object in view is to secure greater attention being paid to the study of Seismology and Terrestial Magnetism. As at present advised my Lords are not prepared to regard these as official subjects for the study and pursuit of which the Exchequer should provide. For this reason and in view of the present financial position They have felt bound to leave out of account both the above proposals in arriving at the figure for the grant-in-aid for the next financial year. This grant-in-aid has markedly increased of late years and They trust that every effort will be made to satisfy the future requirements of your Office with the substantial provision now assigned to it.

As regards the proposed inclusion of the grant of £1,000 in respect of Eskdalemuir, which is now made to the Royal Society, in the grant-in-aid to the Meteorological Office I am to say that, as at present advised, my Lords do not propose to make any change in the existing practice.

I am, &c.,
T. L. Heath.

The Director,
Meteorological Office.

Submitted—the following final estimates for the year 1915–16 revised in accordance with Treasury letter 27,058/14 :—

METEOROLOGICAL OFFICE.

ESTIMATE OF CHARGES UPON THE GRANT FOR 1915–16. SCHEDULE I.

Service.	Voted 1913–14.	Spent 1913–14.	Voted 1914–15.	Proposed 1915–16.	Totals.
Salaries (*see* Schedule II.) :—	£	£	£	£	£
Office	13,458	13,524	14,342	11,463	15,838
Observatories				4,330	
Insurance				45	
Office Expenses :					
Rent, Heating, and Lighting	735	689	700	700	
Furniture and equipment	150		200	100	
Library				50	
Insurances, Repairs	210	500	250	100	
Incidental Expenses and Consumable Stores...				190	
					1,140
Stationery Office (S.O.P.)	50	88	—	60	60
Post Office Charges :					
Postage	660	727	670	750	
					750
Telephones	60	43	78	78	
					78
Telegrams from inland stations	560	586*	600	600	
„ wireless messages	340	356*	340	350	
„ from abroad	890	523*	550	525	
„ sent abroad	525	600*	530	600	
„ Storm Warnings	350	336*	350	350	
„ Harvest Forecasts	65	123*	80	120	
„ sundry messages, &c.	100	246*	130	130	
Allowances to Clerks	210	219*	210	220	
					2,895
Travelling Expenses	400	445	380	400	400
Superannuation :					
Pensions not chargeable on Fund	425	425	425	425	
„ chargeable on Fund	209	194	209	275	
Annuities	862	821	1,012	1,012	
Contribution to Fund	352	541	541	595	
					2,307
Purchase of Instruments :					
Royal Navy	510	912	700	900	
For Office use	300	2,484	450	450	
Other commissions	1,650		1,500	1,000	
					2,350
M.O. Observatories (excluding salaries) (*see* Schedule III.) :					
Kew	525	537	360	412	
Eskdale	365	850	405	500	
Valencia	168	147	116	240	
Farnborough	85	75	100	125	
Falmouth	250	†	150	220	
Benson	170	†	110	243	
					1,740
Edinburgh Office	350	350	350	350	350
Auxiliary Observatories and Stations :					
Subventions : Aberdeen...	295	295	295	295	
Armagh	50	50	50	50	
British Rainfall Organization ...	25	25	25	55	
Royal Meteorological Society ...	50	50	50	—	
					400
Salaries of Observers : Anemograph stations...	70	45	70	670	
Telegraphic stations ...	650	575	600		
					670
Incidental Expenses : Cost of Forms, &c. ...	210	196	210	210	
Agents' Fees	110	75	75	105	
Labels	6	5	6	15	
Postage, telephones, and telegrams.	—	—	—	10	
					340
Lectures and Experiments :					
Schuster Readership	350	156	350	350	
Lectures, &c.	50	1	25	—	
Contribution to International Publication ...	50	50	50	50	
					400
Total	—	—	—	—	29,718

* Estimated from 11 months' payments. † Figures not available.

APPROPRIATIONS IN AID. SCHEDULE I.—*continued.*

—	Voted 1913–14.	Realised 1913–14.	Voted 1914–15.	Proposed 1915–16.	Totals.
	£	£	£	£	£
Office Expenses Refunded:					
Departmental: Administration, &c.	125	128	160	150	
Forecasts	200	159	160	80	
Instruments	130	165	170	100	
					330
Incidental: Administration, &c.	60	99	50	50	
Forecasts and Daily Weather Report.	400	493	450	510	
Instruments	5	28	25	25	
					585
Stationery Office (Sale of Publications) ...	50	58	50	50	50
Telegraphic Expenses Refunded: Home	220	361	235	235	
Foreign	380	452	380	380	
					615
Telephone Charges Refunded	—	—	50	50	50
Inspections	160	211	180	200	200
Instruments: Royal Navy	510	912	700	900	
Other sources	1,500	2,658	1,500	1,000	
					1,900
Superannuation: Interest on Fund	25	29	—	—	
Annuities	862	795	1,012	1,012	
					1,012
Lectures and Experiments:					
Schuster Readership	350	156	350*	350*	
Other sources	100	98	75	—	
					350
Observatories (*see* Schedule III.):					
Kew	590	781	565	570	
Eskdale	1,063	1,303	1,076	1,090	
Valencia	30	36	30	30	
Farnborough	—	254	315	315	
Falmouth	—	—	—	10	
Benson	—	—	—	—	
					2,015
Auxiliary Observatories and Stations (Cost of Forms).	90	108	111	111	111
Tolal	—	—	—	—	7,218
				Net Total	£22,500

* Annual figure.

STATEMENT OF ESTIMATED CHARGES UPON THE GRANT FOR 1915–16. (SCHEDULE II.).

SALARIES, including normal increases: OFFICE AND OBSERVATORIES (Salaries marked * are affected by Allowances).

Establishment.	—	Administration and Library.	I. Marine Division.	II. Forecast Division.	III. Statistical Division.	IV. Instruments Division.	Kew.	Eskdale.	Valencia.	Falmouth.	Farnborough.	Benson.	Total. 1915–16.
		£	£	£	£	£	£	£	£	£	£	£	£
	Director ... ... £800–£1,000	—	—	—	—	—	—	—	—	—	—	—	1,000
	Secretary	350	—	—	—	—	—	—	—	—	—	—	350
	Professional Staff:												
7	Superintendents	—	450	490	490	500	657	442	300	—	—	—	(7) 3,329
7	Senior Professional Assistants	—	—	300	—	—	—	238	—	—	II.	500	(3) 1,038
5	Junior Professional Assistants	152	—	(2) 353	—	—	152	—	125	II.	II.	125	(6) 907
1	Graduate Assistants	100*	—	—	—	—	—	—	—	—	—	—	(1) 100
	Classified Clerical and Technical Staff:												
12	Chief Clerk and Assistants¶	(2) 490	(2) 488	(3) 940§	(3) 613	200	(2) 375	—	—	—	—	—	(13) 3,106
8	Clerks and Mechanical Assistants¶	(2) {150 / 133†}	(2) 288	(2) 345	(3) 425	143	—	—	—	—	—	—	(10) 1,484
8	Clerk Assistants¶	150	—	(2) 225	90	163	—	120	—	—	—	—	(6) 748
8	Clerk Computers¶	(4) 320†	(1) 88	(2) 226	—	83	75	101	—	75	—	—	(11) 968
	Additional Staff:												
	Mechanical Assistants	—	—	—	—	—	75	—	—	—	65	130*	(3) 270
	Supernumerary Clerks	—	—	—	(2) 161	—	—	—	100	—	—	—	(3) 261
	Probationers	(3) 148	(4) 204	(2) 112	(2) 145	48	48	—	—	—	—	—	(13) 705
	Boy Clerks	—	—	—	44	—	44	37	—	—	—	40	(4) 165
	Office or Laboratory Boys...	38	—	—	34	—	—	16	—	—	—	—	(3) 88
	Allowance for Vacancies and Revision	—	—	—	—	—	—	—	—	—	—	—	—
	Office Keeper's Staff:												
	Office Keepers	(2) 198	—	—	—	—	—	—	—	—	—	—	(2) 198
	Storekeeper	100	—	—	—	—	—	—	—	—	—	—	100
	Caretakers	—	—	—	—	—	82*	135	—	—	—	—	(2) 217
	Messengers	(2) 120	—	—	—	63	65	58	39	—	—	—	(6) 345
	Boy Messengers	(3) 90	—	—	—	—	—	—	—	—	—	—	(3) 90
	Cleaners	(4) 122	—	—	—	—	—	45	33	—	—	13	(7) 213
	Watchman	28	—	—	—	—	—	—	—	—	—	—	28
	Lift Attendent	53	—	—	—	—	—	—	—	—	—	—	53
	Occasional Sunday Duty	—	—	—	—	10	20	—	—	—	—	—	30
	Insurance (National Health and Employers' Liability) ...	—	—	—	—	—	—	—	—	—	—	—	45
	Meteorological Office, Edinburgh (*See* Schedule I.)	—	—	—	—	—	—	—	—	—	—	—	—
	TOTALS £1,000	2,742	1,518	2,991	2,002	1,210	1,593	1,192	597	75	65	808	15,838
		Insurance, 45.		Office, 11,463.			Observatories, 4,330.						
	Army Pay at 7*s.* per week for five members of the Staff, 16*s.* for one, 28*s.* for one + £163.	—	—	—	—	—	—	—	—	—	—	—	368

† Female staff. * On Special Service leave without pay. ¶ Excepted from the provisions of the Insurance Act, 1911. II. Included in Forecast Division.
§ Three Senior Professional Assistants are graded as "First Class Clerks."

M.O. OBSERVATORIES. SCHEDULE III.

Service.	Kew.		Eskdale.		Valencia.		Farnborough.		Falmouth.		Benson.	
	1914–15.	1915–16.	1914–15.	1915–16.	1914–15.	1915–16.	1914–15.	1915–16.	1914–15.	1915–16.	1914–15.	1915–16.
EXPENDITURE.	£	£	£	£	£	£	£	£	£	£	£	£
Salaries (*see* Schedule II.)	1,355	1,593	1,137	1,192	441	597	65	65	60	75	340	808
Subventions	—	—	—	—	—	—	—	—	30	30	—	—
Cost of Forms	*	40	*	60	*	10	—	—	—	—	—	—
Rent, Rates, and Taxes	25	28	45	50	73	11	—	—	—	—	—	—
Repairs and Insurance	70	50				50	—	—	—	—	—	—
Fuel and Lighting	75	87	100	120		15	—	—	—	—	—	—
Equipment and Instruments	65	100	50	100		100	—	50	—	60	—	161
Consumable Stores	60	15	60	20	†	5	†	10	52	52	—	60
Books, &c.	15	20	25	20	†	5	†	10	—	—	50	—
Incidental Expenses	50	50	45	35	30	10	100	5	59	23	110	10
Postage and Telegrams	†	5	†	30	13	14	†	40	9	35	—	12
Telephones	†	15	30									
Travelling and Motor Car Expenses	†	2	50	65	†	20	†	10	—	20	—	—
TOTALS (exclusive of Salaries)	360	412	405	500	116	240	100	125	150	220	160	243
APPROPRIATIONS IN AID.												
Subventions: Gassiot Fund	450	450	—	—	—	—	—	—	—	—	—	—
Parliamentary Grant	—	—	1,000	1,000	—	—	—	—	—	—	—	—
Rosse Fund	—	—	—	—	12	12	—	—	—	—	—	—
Advisory Committee	—	—	—	—	—	—	250	250	—	—	—	—
Grazing Rent	5	4	—	—	18	18	—	—	—	—	—	—
Rent of Rooms	—	—	76	76	—	—	—	—	—	—	—	—
Testing Instruments and Commissions	110	100	—	—	—	—	—	—	—	—	—	—
Other Expenses refunded locally	—	16	—	14	—	—	65	65	—	10	—	—
TOTALS	565	570	1,076	1,090	30	30	315	315	—	10	—	—

* Not estimated. † Included with "Incidental Expenses."

METEOROLOGICAL OFFICE. FINAL ESTIMATES for Year 1915–16.

—	Proposed, 1915–16.	Voted, 1914–15.	Increase.	Decrease.
	£	£	£	£
Director	1,000	1,000	—	—
Salaries :				
Office (including Farnborough)	10,508	9,944	564	—
Observatories	4,330	3,398	932	—
Expenses of Office :				
Rent, heating, and lighting	700	700	—	—
Furniture and equipment, Library, Insurances and repairs, Incidental expenses and consumable stores, Stationery Office (S.O.P.)	500	450	50	—
Post Office charges :				
Postage	750	670	80	—
Telephones	78	78	—	—
Telegrams	2,895	2,790	105	—
Travelling expenses	400	380	20	—
Superannuation allowances :				
Annuities	1,012	1,012	—	—
Pensions not chargeable on Fund	425	425	—	—
„ chargeable on Fund	275	209	66	—
Contribution to Fund	595	541	54	—
Cost of instruments	2,350	2,650	—	300
Expenses of M.O. Observatories :				
Subventions, Rent, rates, taxes, repairs, and insurances, Fuel and lighting, Equipment and instruments	1,012	533	479	—
Cost of forms, Consumable stores, Books, &c., Incidental expenses, Postage, telegrams, and telephones	611	708	—	97
Travelling and motor car expenses	117	50	67	—
Auxiliary observatories (2) :				
Telegraphic and anemograph stations (25), Incidental expenses of stations and ships, &c.	1,755	1,741	24	—
British Rainfall Organization	55	25	30	—
Edinburgh Office	350	350	—	—
	29,718	27,644	2,074	—
APPROPRIATIONS IN AID.				
Subventions for observatories :				
Advisory Committee for aeronautics	250	250	—	—
Royal Society	1,462	1,462	—	—
War Office	65	65	—	—
Expenses refunded :				
M.O. observatories	238	209	29	—
Auxiliary observatories and stations	111	111	—	—
M.O. departmental	330	490	—	160
M.O. incidental	585	575	60	—
Stationery Office account	50			
M.O. telegraphic expenses	615	615	—	—
M.O. telephone charges	50	50	—	—
Inspections	200	180	20	—
Instruments (Royal Navy)	900	700	200	—
„ (other sources)	1,000	1,500	—	500
Superannuation annuities	1,012	1,012	—	—
Lectures and experiments	350	425	—	75
Total Appropriation in Aid	7,218	7,644	—	426
Parliamentary Grant in Aid	22,500	20,000	2,500	—
	29,718	27,644	2,074	—

Branch Office at South Farnborough. — The Director reported — that since 27th January he had been in communication with Mr. O'Gorman regarding the estimates for the Branch Office, as constituted under the terms of the memorandum of Minute 496, with reference to the cost of a Flight Assistant and an Aeroplane ; with the result that the latter part of the memorandum had been amended and had been presented to the Advisory Committee for Aeronautics on 9th March, in the following form :—

The Staff of the Branch Office, thus constituted, would be :—

	£
Professor of Meteorology	500–800
Meteorologist	225–300
Assistant Meteorologist	[125–200]
or	or
Flight Assistant	300–300
Special Flying Allowances	200–200
Clerical Assistant	75–150
Laboratory Assistant (Boy)	25–50
	£1,325–1,800

	£ £
Add—for incidental expenses of instruments and running the establishment	175–300
	£1,500–2,100
Average	£1,800
Add—Cost of Maintenance of Aeroplane (Estimate suggested by the Superintendent of the Royal Aircraft Factory)	£3,600
Total	£5,400

The total thus works out at an average of £5,400 per annum, including the cost of an aeroplane, in place of the present £650. This is a large figure, but the work is of the utmost importance, and it is of little use to approach it without adequate resources.

The Air Services are accustomed in every part of their work to demand and get the best, and the meteorological side labours under the disadvantage of having to deal with an intractable atmosphere. Any endeavour to meet their requirements must be put in such a form as to command their respect, and the lines of such an endeavour must be laid on a more ambitious scale than is customary with meteorological work.

The proposal herein set out has the approval of the War Office and the Superintendent of the Royal Aircraft Factory. With regard to the division of responsibility between the War Office and the Meteorological Office, it may be said that the Professor of Meteorology should be associated with the Meteorological Office, because he must rely upon that Office for supplies of information and material and other facilities for teaching. On the other hand the provision of the aeroplane is a matter that falls more naturally within the competence of the War Office, and the flight assistant should come from that side, being appointed by the Professor (or on his nomination) in consultation with the military authorities. There would be advantages in this being regarded as an appointment with short tenure, and the charge of the salary might be divided. The Laboratory boy is already chargeable upon the War Office Vote.

Thus, of the total sum of £5,400, £3,800 might be borne on War Office Votes and £1,600 on the Votes of the Meteorological Office and Advisory Committee in place of the £650 now borne there.

The proposal could not be brought into full operation at once, because an Aeroplane and Flight Assistant could not be spared under present circumstances. The Meteorological Committee would also propose to allow an interval of some months to elapse between the selection of the Professor and the commencement of his duties. The Committee, therefore, only ask for approval of the scheme and the salary of the Professor for three-quarters of the financial year 1915–16, so that they may make the necessary arrangements.

Read—letter (1021/CB.10) from Mr. G. I. Taylor, expressing his willingness to undertake the duties and suggesting a preliminary course of training as an officer of the Royal Flying Corps.

Reported—that the suggestion had been considered by the Advisory Committee for Aeronautics, and that the opinion had been expressed that it would be inadvisable for the Professor to be a flying officer.

It was agreed to make inquiries as to whether the Schuster Readership would be tenable with the Professorship, and to ascertain the opinion of the War Office upon the question of the preliminary training as a flying officer, and further whether the War Office would be willing to present the scheme for the consideration of the Treasury.

Mr. C. J. P. Cave.—Reported—Directors' Order 369, dated 16th February, appointing Mr. C. J. P. Cave Honorary Special Inspector at the Branch Office as from 17th February, to report from time to time on methods of developing the use of

meteorological information in connexion with the Army and the Air Services at South Farnborough and elsewhere, and in particular upon the means of applying the pilot balloon observations to the immediate purposes of the War Services.

Approved.

A draft reply to the Treasury letter printed on page 512 was read, and was despatched on 30th March in the following form, together with the final estimates as printed on page 517 :—

C. 06/574.

SIR, 30th March, 1915.

I HAVE laid before the Meteorological Committee your letter of 3rd February, 1915 (27,038/14), notifying Their Lordships' proposal to ask Parliament to vote an inclusive sum of £22,500 for the expenses of the Meteorological Office in the year 1915–16.

The Committee regret that Their Lordships have felt bound to set the amount of the grant at £1,500 less than that set out in my letter of 2nd December, and they note that, as at present advised, Their Lordships are not prepared to regard Seismology and Terrestrial Magnetism as official subjects for the study and pursuit of which the Exchequer should provide.

[The Committee have accordingly drawn up a revised statement of their estimates for the year 1915–16, showing the allocation of the Grant for that year, which I am to forward for Their Lordships' information.]

The Committee note also Their Lordships' comment on the increased expenditure of the Office in recent years. They have before them the following figures as to the meteorological information collected from sea and land, in relation to the grant, which they desire to bring to Their Lordships' notice.

——	1879–80.	1899–1900.	1904–5.	1913–1914.
Information from Sea—				
Meteorological "logs"	148	159	237	287
Other Marine Registers	35	14	1,946	2,455
From Land –				
Stations in the British Isles ...	112	239	206	540
Grant	£14,500	£15,300	£15,300	£20,000

The stations enumerated are exclusive of Sea Temperature and Fishery Barometer Stations.

All the ships' observations are by volunteer observers, the Office paying only incidental expenses ; and of the 540 stations on land only 33 are maintained or subsidized by the Office, namely :—

28 Telegraphic reporting stations of which five are observatories and 15 others have self-recording apparatus in addition to the normal supplement.
2 Anemograph stations (Armagh and Fleetwood).
The Upper Air Observatory at Benson.
The Branch Office at South Farnborough.
1 Climatological station on Dartmoor, for which £2 is paid to a subordinate official of the Home Office.

The remaining 507, which are mainly climatological and rainfall stations, are "voluntary" so far as the Office is concerned.

But these so-called voluntary observations are, for the most part, not the personal contribution of the actual observer, but are by order of his employer. They are therefore paid for, but not by the Office ; they would probably cost the Office £15,000 a year if the Office had to conduct negotiations directly with the observers. Taking into account the appropriations in aid as well, the grant of £20,000 represents the guidance, organisation and use of an estimated actual expenditure of £44,000 a year in 1914–15, as compared with £25,000 in 1900 when the grant was £15,300, or of £19,000 in 1880 when the grant was £14,500.

Thus the work actually done in proportion to the grant is now nearly double what it was in 1900, and it includes work in and on account of the upper air, which is an entirely new charge.

The Committee are fully aware that it is not the simple accumulation of records that represents the actual service to the public, but it is an essential and fundamental part of that service. It is only when the collection of information has been put on a really satisfactory basis that the work of utilising it can be made really operative.

Something still remains to be done in this respect as indicated in the Committees' last report, and when that has been achieved the actual work of utilising the information will require fresh effort and fresh expenditure. When that time comes the productiveness of the expenditure may be easily safeguarded.

For example, the work upon the daily weather service with the necessary stations, observatories, staff, &c., may be estimated at about £30 a day, apart from general expenses of supervision and distribution. The results are given away to the public services, to newspapers and to the general public.

How much of that cost may be regarded as recoverable if it were put on a commercial basis it is difficult at the moment to say. The reputation which the daily information enjoys in official, journalistic and scientific circles has improved considerably, and it is evident that if by some additional expenditure it could be so far further improved as to make it indispensable to many classes of the community, it would be easy to make the service self-supporting if Their Lordships so desired.

A similar statement is eminently true about the other department of office work, the "public memory of the weather." If everybody in the country were sure of getting a clear and precise

answer to his questions, there would be no difficulty whatever in making charges sufficient to cover the cost. The Committee wish Their Lordships to understand that it is the possibility of increased public usefulness along the lines herein indicated which has always guided them in administering the grants entrusted to them, and they feel sure that their successors will desire to follow the same lines. It means increased expenditure until the service is recognised by the public as thoroughly efficient, and it can then be continued as a public duty, or in large part as a self-supporting service, at Their Lordships' pleasure.

Since the estimates for 1915–16 were framed, a matter has arisen which the Committee feel bound to take up. At the outbreak of war the Reader in Dynamical Meteorology at Cambridge, appointed by the Committee on Dr. Schuster's foundation, wished for some active service. He was recommended to the Air Service and taken on at the Aircraft Factory, where he is still temporarily employed. He is an exceptionally able mathematical-physicist, and was recently lent by the Committee to the Board of Trade for scientific work on the *Scotia*, with the most satisfactory results. As a consequence of his work at South Farnborough the Committee has been given to understand that a man with similar qualifications is exactly what is wanted at the Branch Office there, to meet the practical requirements of the Air Services, which have naturally changed with the recent remarkable progress in flying. The Committee concur, but it must be recognised (1) that the new form of service must be of a special character, and must be in addition to, and not instead of, the old, which still retains its fundamental importance; (2) that the use of an aeroplane and pilot for the purposes of investigation is also necessary.

These changes would involve considerable expense, part of which might fall on the War Office Vote, or on that of the Advisory Committee for Aeronautics. The Committee are in communication with the War Office and the Advisory Committee on the subject.

I am, &c.,
W. N. SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W.

508. OBSERVATORIES.—**Kew.**—*Water Supply.*—Reported—that in connexion with the garden and the question of fire appliances referred to in Minute 444 correspondence on the subject of the provision of an ample supply of water had passed between the Office and the Office of Works (4,470/14/CK. 20) as a result of which the Office of Works have arranged with the Richmond water authorities for the provision of a continuous supply of water to the observatory.

Garden and Grounds.—Reported—that Mr. Middleton and the Director of the Royal Gardens, Kew, had presented to the observatory a number of young roses, which had been planted in the garden in front of the magnetic huts, also three trees for the lawn on the east side of the observatory.

Staff.—On a report of the Director it was agreed that Mr. E. H. Nichols' appointment be continued until 30th June, 1915, and that he be transferred to the Central Office for the three months of his appointment. (Minute 479.)

Eskdale.—*Post Office* (Minute 480).—Submitted—the following Memorandum by Mr. Richardson:—

We have this morning had a visit from two Post Office officials—Mr. Ord, an Assistant Surveyor from Glasgow, and the postmaster from Langholm—with reference to a Post Office at the Observatory. I have discussed the situation with them; Mr. Ord will consider it and write about it. The proposals are as follows:—

Name.—To be called Davington Post Office unless you object.

Premises and equipment.—They approved of using the front porch as the public part of the office (*vide* my letter CE.20 of 1914, Sept. 16). The public telephone to be put in here instead of in a silence cabinet. If two people arrive at once, one must be invited into the Observatory while the other speaks. The post-box to be in the window near the top of the front steps.

Sorting table for letters to be provided upstairs by the Observatory if required later on.

Extension telephone to be moved from top house to bottom house and a strong bell fitted.

Hours.—I asked that Savings Bank and Postal Order business should be confined to the following hours—10h. 15m. to 12h. 15m., plus, if absolutely necessary, 14h. to 15h.

I asked further that the despatch and receipt of telegrams and telephones should be confined to the following hours—8h. to 9h., and 10h. 30m. to 18h. Mr. Ord said these hours were very unusual, but he would put forward the proposals.

Sundays.—Telegraphic 9h. to 10h. obligatory.

Financial arrangements.—Mr. Ord was rather vague, but there seems a possibility that, if the telephone in the porch is in substitution for the one now in the library, then there might be some reduction in the annual rent.

The 'phone in the bottom house would, he thought, be charged to the M.O. and therefore I think the one in the top house had better be given up.

He said the M.O. must insure the cash against burglary. They expect M.O. to provide a locked drawer for valuables.

Prospect of improved postal service.—Mr. Ord asked what would be the least that I would consider an improvement. I said that the post should arrive an hour before it left. He said they were considering the possibility, and that one requisite was that M.O. should arrange to clear the post box at Davington and to bring the letters to

Eskdalemuir Post Office every day at about 2h. 30m. p.m. For this there would be an allowance of 2*s.* 6*d.* per week. A bicycle would not be provided.

Time to start.—Mr. Ord expected that it would be some months before the equipment for a post office at the Observatory was ready.

Money Orders, Pensions and Licenses would not be dealt with.

17th February, 1915.

It has since been reported by Mr. Richardson that arrangements for the improvement of the postal service to the observatory are being considered independently.

Valencia.—*Superintendent.—Mr. Cullum's pension* (Minute 480).—It was agreed to authorise the purchase, as soon as funds permit, of an annuity of £143 10*s.* per annum for Mr. J. E. Cullum on his retirement from the position of Superintendent of Valencia Observatory on 1st May, 1915. Until funds are available for the purchase of an annuity from the Commissioners for the Reduction of the National Debt, the superannuation allowance is to be paid out of Office revenue.

Equipment.—Reported—that at the Director's request Mr. L. H. G. Dines had visited the Valencia Observatory from 12th March to 17th March, and had recommended (M.O. 1209 C.V 51) that the following articles, which would be required for the use of the Observatory, should be purchased from Mr. Cullum at a cost of £8 2*s.* 3*d.*:—A ladder, a writing-table, a chimney-sweeping gear, and an electric extension bell.

Approved.

Reported—a letter from Mr. L. H. G. Dines to the effect that Mr. Cullum had occupied one of the plots of land for grazing in addition to the garden and had kept the road from the Observatory to the highway in repair at his own expense, and asking for the continuation of the arrangement.

Approved.

Repairs.—Also—asking for a statement of his position with regard to outward structural repairs, internal repairs and decorations.

It was agreed that both internal repairs and decorations at the discretion of the Committee, as well as outside repairs, should be undertaken by the Committee.

South Farnborough.—Reported—that Mr. H. Billett, Junior Professional Assistant, before leaving to take up his duties in South Africa, had applied (831/C.B. 11) for some extra emolument in consideration of loss of leave and extra attendances at the Office on account of the war, and in view of the high cost of living at Farnborough, which he had not foreseen at the time of his appointment.

It was agreed to say that the Committee are unable to pay extra emolument in the circumstances explained, and the Director was authorised to make a present of Office publications.

Benson.—*Mechanical Assistant.*—The Director reported:—Mr. Dines' Mechanical Assistant at Benson Observatory, H. W. Baker, who was not, for the time being, employed on work directly applicable to military operations, felt it his duty to place his services at the disposal of the country, and at his request he was recommended as a skilled instrument-maker to the Superintendent of the Royal Aircraft Factory. He was accepted, and has been employed there since 15th February. He has thereby sacrificed 9*s.* a week in wages.

No provision was made beforehand for this contingency because wages at the Aircraft Factory are not a flat rate like Army pay, but are adjustable according to the technical skill of the workman.

Mr. Dines has applied that the 9*s.* a week should be made up out of Office funds on the ground that Baker's qualifications are peculiarly valuable to the Observatory and on that account he should receive the 9*s.* a week as a kind of retaining fee.

The case is not provided for by existing regulations, which apply only in those cases in which the new employment automatically ceases at the end of the war. A skilled mechanic is not in that position, and the Aircraft Factory is quite as favourably placed as the Meteorological Office for recognising the value of public service.

On the Office Staff Baker is on weekly wage at 54*s.*, and Mr. Dines has from time to time pressed for his being placed on the graded staff, with provision for superannuation. I suggest that on his return to work at the Observatory he be placed on the graded list as full Assistant, with seniority to date from the age of 25 as set out in the regulations, and that the period at the Aircraft Factory be reckoned as approved service.

Approved.

Falmouth.—*Mr. C. D. Stewart.*—Reported—that Mr. Stewart had applied for permission to join the Army on Civil Service terms.

It was agreed that Mr. Stewart's appointment in connexion with the Forecast Division renders it undesirable that permission be granted.

State of Preservation of old Rainfall Records.—Reported—that the paper upon which the original records of the autographic raingauges at the observatories were obtained from 1871 to 1892, which is of a white colour, is found to be in a bad state of preservation. The surface of the paper of the earlier records has become fragile and falls away on handling, and the later records are showing signs of similar decay. Since 1892 the white paper has been replaced by green "Willesden" paper, and the records obtained thereon are in a good state of preservation. The rainfall records date back to 1871, but for a short time at first a yellowish glazed paper was used, and the corresponding records appear to be in perfect condition. An order is requested as to the destruction or further preservation of the records.

It was agreed to consult Sir J. J. Dobbie, Government chemist, as to whether any steps could be taken to prevent further decay, to destroy those cards that have actually become undecipherable, and to await expert opinion before deciding as to the others.

509. Stations under Local Authorities.—Submitted—a memorandum on the local importance of meteorological observations, and suggesting that the present time is a favourable opportunity for local authorities to consider whether an adequate record is kept of the weather conditions in their respective areas, so that inquiries about the weather, as relating to the economic life of the community, may be satisfactorily answered.

It was agreed that a letter be addressed to the Board of Agriculture and Fisheries setting out the matter, and asking for the opinion of the Board on the suggestion.

510. Directors' Report and Accounts :—

Publications.—**Advertisements.**—*Stationery Office.*—Reported—the receipt of a circular letter dated 2nd February, 1915 (552/0.009), from the Stationery Office, stating that the Treasury have expressed the opinion that all newspaper advertising for Government Departments should be centralised in the Stationery Office, and asking for a return showing the nature and amount of the advertising required by the Office during 1913-14.

Mr. Christopher Ogle.—Reported—the receipt of letters from Mr. Christopher Ogle complaining that the official agents for the Sale of Office Publications do not take such trouble as they should in connexion with the sale of publications, and proposing to bring the serial publications of the Office to the notice of various Institutes and Colleges of which he is a member of the Governing Bodies, with a view to inducing the Institutes to take an interest in them.

New Publications.—*Normals of Temperature, Rainfall and Sunshine.*—Reported—that the Weekly Weather Report for 1913 has been completed by the publication of "Normals of Temperature, Rainfall and Sunshine" with illustrative maps, which forms Appendix IV. to the Report.

Computer's Handbook.—A commencement has been made with the publication of the Computer's Handbook by the setting up in type of a humidity table based on Glaisher's factors arranged for the absolute Scale of temperature. The manuscript of a further section has been sent to the printer, and further manuscript is nearly ready.

Marine Observer's Handbook.—500 Copies of the Handbook were received on 20th March. It is proposed to bind them in limp brown cloth, and present copies to Marine Observers.

Monthly Meteorological Charts (Minute 500).—Submitted—copy of the Monthly Meteorological Chart of the North Atlantic for April, 1915, showing the representation of ocean currents by means of flow-lines, similar to that of Admiralty publications.

Reported—that the Stationery Office had arranged that impressions of the dark-blue stones for the twelve months of each of the two Monthly Charts be preserved by the Office press in the form of zinc plates, in accordance with the suggestion of Minute 500.

Réseau Mondial.—Submitted—two specimen printed quarto pages of the Climatological Report of the Globe for 1911. It is proposed to print the whole of the tables on the general plan indicated by the specimens. The whole of the manuscript of the publication is practically ready, but the maps are not yet prepared.

Reports of Work.—0. *Library, Réseau Mondial and Technical Inquiries* (January).—Library—Current work. 39 authors' cards and 4 cross reference cards prepared. 149 books borrowed by Office Staff. Daily Weather Reports for parts of 1914 for Japan, Switzerland, France, and Denmark, sorted for binding.

Number of Publications received.—530.

Inquiries.—Personal, 29; Letters, 38.

Receipts for Inquiries.—£5 11*s.* 3*d.*

Miscellaneous.—Preparation of meteorological data for African Pilot, Part II, for the Admiralty, nearly completed.

Réseau Mondial.—Checking of data for 1911 and preparation of averages proceeded with. Some unpublished data which had been asked for was received and inserted. Lustrum average forms prepared for Penang, Tulagi and Ocean Island. Corrections to reduce mean of mean maximum and minimum temperature to mean of 24 hours prepared for many stations.

Colonial and Foreign Returns.—54 manuscript returns received. Statement prepared of amount of space required for Colonial data.

Inquiry Assistants.—Miss Smith.—Preparation of data for East African Pilot, Part II. Translating account of cyclone at Port Amelia, Mozambique, April 12th, 1914, and preparing a note

on it for Marine Division. Summarising section of Drygalski's "Greenland Expedition" (Origin of the diluvium) for Captain Hepworth. Checking barometer readings at Gibraltar 1898–1901. Bringing up to date list of winds, force 10 and upwards, for British Isles, for "Seaman's Handbook."

Miss Turney.—Preparation of lantern slides for Dr. Chree, Mr. Bryant, Mr. Richardson and Mr. Corless. Preparation of Roll Calendar for February, litho. transfers for M.W.R. for December, and various diagrams and forms.

(February).—Library.—Current work. 35 authors' cards and 3 cross reference cards prepared. 149 books borrowed by Office staff. 29 volumes received from binders, examined, press-marked and placed on shelves.

Number of Publications received.—480.

Inquiries.—Personal, 19; Letters, 48.

Receipts for Inquiries.—£14 12*s.* 6*d.*

Miscellaneous.—Preparation of meteorological data for African Pilot, Part II. nearly completed. Lustrum forms prepared for Grenada (pressure), Gibraltar (35 years means for Monthly Weather Report).

Preparation of statement for Department of Agriculture showing information available for comparison of climate of East Anglia and beet-growing districts of Continent.

Réseau Mondial.—Checking of data for 1911 and preparation of averages and corrections nearly completed. A number of returns were received from various countries in response to letters; these were entered and checked.

Foreign and Colonial Returns.—170 manuscript returns received from Foreign and Colonial Stations.

Inquiry Assistants.—Miss Smith.—Completed preparation of data for African Pilot, Part II. Checking barometer readings at Gibraltar, 1898–1906. Preparation of duplicate tables of data for Mediterranean Pilot. Preparation of barometer card for Grenada. Completed summarising of extracts from Drygalski's "Greenland Expedition" for Captain Hepworth.

Miss Turney.—Preparation of lantern slides for Mr. Keevil, Dr. Chree, Mr. Dines and Mr. Gold. Preparation of Roll Calendar for March, litho transfers for January M.W.R. and Annual Summary, and various diagrams and forms.

Publications.—Report for January and February, 1915 from Clerk of Publications :—

—	January.		February.	
	Received.	Issued.	Received.	Issued.
Daily Weather Report	750	572*	750	558*
Weekly Weather Report	375	320*	375	319*
Monthly Weather Report, &c. ...	600	483*	—	—
Do. do. (Maps)	25	2	—	—
Daily Readings, 1914...	75 (Nov.)	49 (Nov)*	—	—
Geophysical Journal, 1913	150 (Dec.)	122 (Dec.)*	—	—
Hourly Values — Meteorological, 1913 :—Kew	300 (Nov.)	12 (Nov.)	300 (Dec.)	—
Eskdale	300 (Nov.)	12 (Nov.)	300 (Dec.)	—
Valencia	—	12 (Nov.)	300 (Dec.)	—
Monthly Meteorological Charts (Atlantic).	600 monthly to Feb. (3)	474*	600 monthly to March (2)	402*
Monthly Meteorological Charts (Indian).	350 (Feb.)	299*	350 (March)	200*
International Upper Air Observations, 1912.	—	—	—	—
Ninth Annual Report	—	—	—	2
Observer's Handbook (1914) ...	—	18	—	7
"Forecasting Weather"	—	—	—	—
Cloud Atlas	—	—	—	—
Calendar, 1915	—	1	—	—
Structure of the Atmosphere ...	—	—	—	—
Seaman's Handbook	—	19	—	9
Report on Work of s.s. "Scotia" (2 vols).	—	—	—	1
Geophysical Memoirs, No. 1 ...	—	2	—	8
No. 2 ...	—	1	—	7
No. 3 ...	—	2	—	7
No. 4 ...	—	1	—	7
No. 5 ...	—	3	—	7
No. 6 ...	—	2	—	7
No. 7 ...	—	2	—	8
No. 8 ...	—	1	—	8
No. 9 ...	—	2	—	7
No. 10 ...	—	3	—	8
No. 11 ...	600	2	—	314*

* Issue restricted on account of War conditions.

Receipts from sales at M.O.—£5 4*s.* 8*d.* (January), £2 16*s.* 9*d.* (February).

New Publications (January and February).—Copies of Geophysical Memoirs No. 11 were received in January and general issue made in February.

Special binding cases to contain the Calendar and List of Stations were received in January and despatched to about 300 observers.

The Marine Observer's Handbook was signed for press on 3rd February.

M.O. Press (November, 1914, to February, 1915).—The printing of the undermentioned publications has been as contract :—

Daily Weather Report.
Maps for the Monthly Weather Report.
Charts of the North Atlantic Ocean.
Charts of the Indian Ocean.

Work on hand throughout the period :—

London Rainfall Diagram.
Charts of Davis Strait and Baffin Bay.
Two litho plates for Hourly Values—Geophysical, 1913.

Work on hand at beginning of period and discharged during period :—

14 Plates for normals of temperature, rainfall and sunshine.
Two plates for Marine Observer's Handbook.
Five plates for Geophysical Memoirs No. 11.
Copies of radiation record for Cambridge Scientific Inst. Co.

Work received and discharged during the period :—

Form 550 (thermogram).
„ 545 *a* and *b* (pressure tube anemogram).
„ 531 (small barogram).
„ 560 (direction and velocity pressure tube anemogram).
„ 528 (Eskdale psychrogram).
„ 548 (Richard thermogram).
„ 530 (Small barogram).
„ 561 (Robinson anemogram).

Work received during period and on hand at end of period :—

Diagram illustrating memorandum on ventilation of Eskdale magnet house.
Form 553 (Beckley rain gauge).
„ 537 (Large barograph).
„ 567 (Baxendell direction anemogram).
Plates for Circular E. 03.
Map for Year Book, Part III., 1914.
Plates for Seaman's Handbook, 2nd edition.

1. *Marine Division* (January).—Logs and Registers.—Dealt with on receipt, 19 Meteorological Logs and one Lighthouse Register; also 57 North Atlantic Registers, three Radio-telegraphy Registers, and five Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic.—The issues for February, 1915, published; the issue for March, 1915, in course of preparation.

Monthly Meteorological Charts of the Indian Ocean.—Issue for March, 1915, in course of preparation.

Monthly Meteorological Charts of Davis Strait and Baffin Bay.—Proofs examined, and distribution of surface temperature indicated by shading in blue. The latter now ready for lithographer.

Ice Frequency at the Mouths of the German North Sea Rivers.—Extracting data relating to ice conditions at the mouths of the German North Sea Rivers, and drawing diagrams to illustrate the same ; referable to the period 1903 to 1913 for the Admiralty.

Wind Charts of the North Sea, 1879–1908.—Grouping winds and drawing wind-roses for the North Sea Charts, in five-degree areas, for the Admiralty.

Extracting and Tabulating Data for Load Line Committee relative to Gales in the North Atlantic.—Completed 1906–7, and partly completed 1905–6. Number of years completed up to 31st December : eight.

Extracting and Plotting Data for Monthly Charts of the Globe.—Observations extracted from four logs.

Corrections for Barometers obtained in connexion with

(1) Reports by Radio-telegraphy	6
(2) North Atlantic Registers	2

Observational Duties.—Time occupied : 23 hours.

Extraction of Observations recorded in Selected Areas for the Indian Government.—Time occupied : eight hours.

Indexing in ocean 10° squares.

Notice of Ice sent to "Shipping Gazette" on one day.

Correcting proof of "Marine Observer's Handbook," and adding data to the second edition of the "Seaman's Handbook of Meteorology."

(February).—Logs and Registers.—Dealt with on receipt, 13 Meteorological Logs, and four Lighthouse Registers; also 57 North Atlantic Registers, one Radio-telegraphy Register, and four Indian Ocean Registers.

Monthly Meteorological Charts of the North Atlantic.—The issue for March, 1915, published ; the issue for April, 1915, in course of preparation.

Monthly Meteorological Charts of the Indian Ocean.—The issue for March, 1915, published ; the issue for April, 1915, in course of publication.

Extracting and Plotting data for Monthly Charts of the Globe.—Observations from two logs.

Extracting, Plotting, and Tabulating Air and Sea Temperatures and Winds over the North Sea, and waters adjacent to the United Kingdom, for the Admiralty.

Corrections for Barometers obtained in connexion with

(1) Reports by Radio-telegraphy	5
(2) North Atlantic Registers	3

Preparing Monthly Salinity and Sea Temperature Charts of the North Atlantic and English Channel.—For November and December, 1914.

Observational Duties.—Time occupied, 27 hours.

Indexing in ocean 10° squares.

Notices of ice sent to "Shipping Gazette.—On 10 days.

Making additions to and examining Plates of Seaman's Handbook.

The staff has been engaged principally upon work for the Hydrographic Department of the Admiralty.

A set of M.O. instruments have been lost by the sinking of the "Bayano" by an enemy ship. The "Bayano," owned by Messrs. Elders and Fyffes, was commissioned at the commencement of hostilities, and was in H.M. service at the time.

2. *Forecast Division* (Central Office, January).—(1) The work of the Division has been carried on with the restrictions indicated in previous reports, and has been kept up to date as far as possible.

(2) Supply of Information to the Services.—In addition to the various reports referred to in previous reports :—

(*a*) The C.O., R.F.C., M.W., Shoreham-by-Sea, C.O., R.F.C., M.W., Fort Grange, Gosport, have been added to the list of officers receiving forecast telegrams at 3 a.m., 9 a.m., and 7.30 p.m.

Similar telegrams to C.O., R.F.C., Dover, have been discontinued.

(*b*) A forecast for the North of France has been prepared each morning and communicated to the Admiralty. The forecast is added to the report of the state of the weather on the British coasts, sent to the First Sea Lord and other officials.

(*c*) Arrangements have been made to supply copies of all reports and telegrams dispatched to Admiralty addresses to the Meteorological Officer of the Admiralty.

(*d*) Arrangements have been made for a forecaster to be on duty on Sundays, for the purpose of dealing with urgent inquiries in case of necessity.

(3) Wireless Reports.—None.

(4) Wind Frequency Results.—Extracted to end of September.

(5) Working Charts prepared for binding up to 5th September.

(6) Checking of 8.30 p.m. Forecasts.—Completed up to November 8th. The first half of December has also been dealt with.

(7) Storm Warning Checking. Completed :—

Anemometer Stations to end of November.
English Lighthouses to end of December.
„ Lightships to middle of January.
Scottish Lighthouses to end of November.
Irish „ „ „ „

(Branch Office at Farnborough, January.)—The regular observing work has been continued.

Telegraphic forecasts have been received from the Meteorological Office, London and transmitted to the Headquarters of the Royal Flying Corps as in the latter part of December. In addition, the morning forecast is now transmitted by telephone to Mr. A. D. Ritchie at the Naval Airship sheds with any other current information which may be available, such as the results of pilot balloon ascents and cloud observations.

During the month an advance copy of the 7 a.m. weather map, sent from the Meteorological Office by railway letter, has been received each afternoon, Saturdays and Sundays excepted. For the last week of the month a copy of the evening map has also been sent by letter post and this information has been supplemented by telegraphic advice of the changes which have occurred by the time of the early map the following day.

The Meteorologist in Charge has attended at the Meteorological Office, London on 6 nights during the month to carry out the early morning forecast work.

13 single theodolite pilot balloon ascents have been made.

An investigation was carried out into the weather conditions prevailing at the time of the German aircraft raid on Yarmouth and King's Lynn on the 19th of the month.

An enquiry into the effect of temperature changes on the aneroid barograph has been carried to completion.

During the month the screen and grass thermometers have been compared with a standard thermometer from the Meteorological Office and their errors determined. The clock of the self-recording raingauge, which had been giving trouble for some time past, has been repaired.

In conjunction with Mr. Gold the Meteorologist in Charge has drawn up a revised form of analysis sheet for summarising the records from anemographs, with detailed instructions for the purpose of bringing the work of different computers into greater harmony than has prevailed in the past.

During the month Mr. Billett was absent for 7½ days on sick leave.

Mr. H. S. Allnutt left on the 23rd in order to take up an appointment in the Royal Aircraft Factory.

(Falmouth Observatory, January.)—Routine Work.—Monthly Return (Form 355) (two copies) Completed and checked for December, 1914, January in hand.

Tabulation of :—

Barograms (Form 402).—Tabulations up to date for comparison with eye observations.

Hourly Values of Rainfall (Form 410)	Completed and checked for December, 1914, January in hand.
Hourly Values of Sunshine (Form 403)	
Plymouth Pressure Tube Anemograms (Form 430)	
Falmouth Robinson Anemograms (Form 401)	
Scilly Robinson Anemograms (Form 401)	
Falmouth Record of Wind Direction (Form 224)	Completed and checked for December, 1914.
Scilly Record of Wind Direction (Form 224)	

Analysis of :—

Pendennis Pressure Tube Anemograms (Form 339)	Up to date.
Scilly Pressure Tube Anemograms (Form 339)	
Plymouth Pressure Tube Anemograms (Form 339)	

Two pilot balloon ascents.

Weekly returns to the Central Office for the Weekly Weather Report.

Monthly report to the County Council.

Mr. Goldie's services were transferred to the Meteorological Office on the 13th January.

(Central Office, February).—(1) The work of the Division has been carried on with the restrictions and modifications indicated in previous reports, and has been kept up to date as far as possible.

(2) Supply of information to the Services :—

(*a*) Telegraphic reports to Naval Airship Stations at Farnborough were discontinued at the end of the month in consequence of the transfer of the station elsewhere.

(*b*) Arrangements have been made to send to the Aeronautical Branch, and to the Directorate of Home Defence at the War Office, copies of the Daily Weather Report, accompanied by brief notes on the meteorological situation as we judge it would present itself to an enemy forecaster receiving no reports from France and this country. These reports are supplemented by reports by telephone sent in the evening.

(*c*) A revised list of naval centres to which telegraphic reports are sent twice a day was received from the Hydrographic Office on February 20th and brought into operation without delay.

(3) Wireless Reports.—Eight messages from s.s. "New York."

(4) Wind Frequency Results extracted to end of September, and for three stations out of ten to end of October.

(5) Working Charts Prepared for binding to end of September.

(6) Checking of 8.30 p.m. Forecasts completed to January 20th. Summaries of Results completed to end of September. Those for October to December, 1914, in course of preparation.

(7) Storm Warning Checking :—

Anemometer Stations to end of November.
English Lighthouses to end of December.
Do. Lightships to middle of January.
Scottish Lighthouses to end of December.
Irish „ „ „ „

(8) A report on Recent Airship Weather has been prepared and forwarded to the Advisory Committee for Aeronautics.

(9) Demands from the Hydrographic Office for various diagrams and statistical results have been complied with.

(10) The completion by the Post Office engineers of arrangement whereby telegrams can be received or dispatched from the telephone room has proved a great convenience and contributed materially to the smooth working of the telephone service.

(11) Arrangements have been made to supply to the Director General of the Ordnance Survey the mean pressure at a number of stations in Iceland and Northern Europe as early as possible after the completion of each month.

(12) Mr. Goldie was in attendance at Meteorological Office throughout the month to assist in 3 a.m. work.

(Branch Office at Farnborough, February.)—The regular observing work has been continued.

The forecasts received from the Meteorological Office, London, have been transmitted to the Headquarters of the Royal Flying Corps throughout the month as previously, and a copy of the morning forecast has also been supplied for exhibition in the Royal Aircraft Factory since the 23rd of the month. Owing to the discontinuance of the Naval Airship Station at Farnborough the supply of information to the airship sheds has ceased from the 15th.

Thirteen single theodolite pilot balloon ascents have been made.

Upper air horizontal temperature gradients have been calculated and compared one with another for those occasions where two or more pilot balloon ascents have been made on the same day.

The clock of the thermograph failed towards the end of the month. This has been repaired and a better protection from dust and moisture provided for the balance wheel of the clock.

The regular analysis work has been kept up to date.

Mr. C. J. P. Cave has attended at the Office since the 24th of the month.

Mr. H. Billett left on the 24th to enter the Meteorological Service of South Africa.

H. S. Paine commenced duty as office boy on the 16th, and is being trained to assist in observing.

In spite of the changes in staff during the last two months the work of the Office has been carried on without interruption.

(Falmouth Observatory, February).—Routine Work.—Monthly Return (Form 355) in hand: delayed owing to absence of Mr. Phillips from 28th February.

Tabulation of :—

Barograms (Form 402): In hand.
Hourly Values of Rainfall (Form 410): February finished.
Hourly Values of Sunshine (Form 403): February finished.
Falmouth Robinson Anemograms (Form 401): February finished.
Scilly Robinson Anemograms (Form 401): February finished.
Falmouth Record of Wind Direction (Form 224): February finished.
Scilly Record of Wind Direction (Form 224): February finished.

Analysis of :—

Pendennis Pressure Tube Anemograms (Form 339)
Scilly Pressure Tube Anemograms (Form 339) } February analysis finished.
Plymouth Pressure Tube Anemograms: Finished up to 27th February, inclusive; 28th curve not yet to hand.

Pilot Balloon Ascents, &c.—None. Mr. Phillips was in sole charge for the greater part of the month. Mr. Stewart took up residence at Falmouth on 24th February.

3. *Statistical Division* (January).—British Meteorological and Magnetic Year Book:

(1) Weekly Weather Report.—Current issues (No. 52, 1914—3, 1915) except the charts, which will be issued when the necessary data have been received.

Appendix I. nearly completed.
Appendix II nearly completed.
Appendix III. Annual Wind Summary, 1914, nearly completed.
The values of rainfall in the Weekly Report have been published in millimetres and inches. The conversion of the weekly averages from inches to millimetres has been completed.
The returns from Poltalloch in Argyllshire have been discontinued. The station had been used for District Values for Scotland W. since September, 1907.

(2) Monthly Weather Report.—December issued.

Annual Summary for 1914 nearly completed.
Corrections to Monthly Weather Report to date.
The necessary arrangements have been made for the publication of rainfall in millimetres during 1915.

(3) (i) Daily Readings.—November, 1914, issued.
(ii) Geophysical Journal.—December, 1913, issued.
Annual Summary, 1913; proofs received and circulated.

(4) (i) Hourly Values—Meteorological, 1913:

Valencia.—December, signed for press.
Kew.—December, signed for press.
Eskdalemuir.—November, signed for press; December, copy sent to printer.

(ii) Hourly Values—Geophysical: Proofs of eight pages of magnetic tables and notes for 1913 received and various points settled by discussion with and between Mr. Richardson and Dr. Chree. Proofs returned for revision and further copy sent to printer.
Aberdeen.—Relative Humidity (Hourly Mean Values) worked. Pressure and Temperature (Hourly Mean Values) checked.
Falmouth.—Hourly Summaries of Rainfall and Sunshine received and ready for copying to printer's form.

Registrars-General:

Quarterly Report for Registrar-General, England, prepared.
Quarterly Report for Registrar-General, Ireland, prepared.
The Registrar-General for England and Wales, having expressed his willingness to publish values of rainfall in millimetres in his returns, the values from 1st January, 1915, are being furnished to him in terms of millimetres.

Anemograms: (1) Pressure tube. Analysis completed up to date for—

16 stations at the Meteorological Office.
4 „ „ South Farnborough.
3 „ „ Falmouth.
1 station each at Benson, Eskdalemuir and Kew.

Pressure tube. Hourly Tabulations completed up to date—

3 stations at the Meteorological Office.
1 station at Falmouth.
1 „ „ Eskdalemuir.

(2) Robinson Cup Anemograms. Hourly Tabulations completed up to date—

5 stations at the Meteorological Office.
2 „ „ Falmouth.
1 station each at Aberdeen, Kew and Valencia.

Sunshine Cards.—The cards from 74 stations for December were examined and returned with a comparison of the estimated duration of sunshine made by the Observer with that made in the Office. The cards from 124 stations were examined and filed in the Office.

Aneroidograms.—Form 529 from 13 stations, Form 530 from 11 stations, Form 531 from 10 stations, Form 533 from 2 stations, Form 536 from 3 stations, Form 537 from 1 station and various others from 7 stations, filed up to date.

Thermograms.—Form 542 from 1 station, Forms 547 and 548 from 6 stations and Form 549 from 1 station, filed up to date.

Miscellaneous.—Rain curves and hyetograms from 7 stations, microbarograms from 2 stations, radiograms from 1 station and hygrograms from 3 stations, filed up to date.

Annual tables for 1914 prepared for Eastbourne and St. Leonards.

Rainfall returns from 95 stations entered on Summary Sheet (Form 372) and monthly totals obtained.

The Fleetwood anemograph tabulations for December, 1914 and Holyhead anemograph tabulations for January, 1915 were copied and sent to the usual recipients.

Hourly tabulations were made from the Shoeburyness anemograms for 28th–29th December, 1914 and from South Kensington anemograms and St. James's Park pluviograms for 7th, 19th and 20th December, 1914, for the Inquiry Branch.

The sunshine cards for December, 1914 from Bath and Balruddery were tabulated for use in the December Monthly Weather Report.

The scale values of temperature and time for the new glass measuring scales for reading the photographic thermograms in Degrees A. have been fixed and the scales have been sent to Eskdalemuir and Aberdeen. The time scale for Kew has been slightly altered by using only one photographic sheet on each cylinder instead of two. Allowance has been made for this. The use of two photographic sheets is still continued at Aberdeen.

Instructions for the Analysis of Pressure Tube Anemograms have been drawn up and are being printed on the Forms used for the Analysis.

(February)—British Meteorological and Magnetic Year Book.—(1) Weekly Weather Report.—Current issues (Nos. 4–7) except the charts, which will be issued when the necessary data have been received.

The returns from the station at Poltalloch have been discontinued, and up to the present the proposal that the observer at Oban should send weekly returns has not been accepted.

Further work has been done on the wind supplement which is being incorporated with the Annual Summary of the Monthly Weather Report. It has previously been issued separately as Appendix III to the Weekly Report.

(2) Monthly Weather Report.—Some re-arrangement of the tables has been made. The values of rainfall are given in millimetres: the totals in inches and tenths are also included.

January, 1915, prepared but not issued.

Annual Summary, 1914, waiting for the completion of the summaries of wind from the hourly tabulation of anemograms.

(3) (i) Daily Readings.—Annual Summary, 1914, prepared.
(ii) Geophysical Journal.—The Annual Summary for 1913 has been passed for press.

(4) (i) Hourly Values—Meteorological, 1913.—Valencia.—December issued.
Kew.—December issued.
Eskdalemuir.—November and December issued.
Preparation of Yearly Tables for the above Observatories in hand.

(ii) Hourly Values—Geophysical, 1913.—Aberdeen.—Conversion of Hourly Values of Pressure and Temperature into C.G.S. units, and finding their departures from the normal values: also working out Mean Hourly Wind values.

Anemograms.—(1) Pressure-tube Analysis completed up to date for—
16 stations at the Meteorological Office.
4 „ „ „ South Farnborough.
3 „ „ „ Falmouth.
1 station each at Benson, Eskdalemuir, and Kew.

Pressure-tube.—Hourly Tabulations completed up to date:—
3 stations at the Meteorological Office.
1 station „ Falmouth.
1 „ „ Eskdalemuir.

(2) Robinson Cup Anemograms.—Hourly Tabulations completed up to date:—
5 stations at the Meteorological Office.
2 „ „ Falmouth.
1 station each at Aberdeen, Armagh, Kew, and Valencia.

Sunshine Cards.—The cards from 124 stations were examined and filed in the Office.

Aneroidograms.—Form 529 from 13 stations filed up to date.
„ 530 „ 11 „ „
„ 531 „ 10 „ „
„ 533 „ 2 „ „
„ 536 „ 3 „ „
„ 537 „ 1 station „
Various others from 7 stations „

Thermograms.—Form 542 from 1 station filed up to date.
„ 547 „ 5 stations „
„ 549 „ 1 station „

Miscellaneous.—Rain curves and hyetograms from 6 stations filed up to date.
Microbarograms and Radiograms from 2 stations filed up to date.
Hygrograms „ 2 „ „

A memorandum on the measurement of duration of rainfall was prepared after consultation with Mr. C. Salter, representing British Rainfall Organization. On some points discussion is still in progress.

The Fleetwood anemograph tabulations for January, 1915, and Holyhead anemograph tabulations for February, 1915, were copied and sent to the usual recipients.

The sunshine cards for January, 1915, from Bath and Balruddery were tabulated for use in the January Monthly Weather Report.

The forms used in connexion with the observation and reduction of the values published in the Year Book have been arranged according to the sections of the Year Book with which they are principally associated and have been renumbered.

4.—*Instruments Division* (January and February).—Admiralty Work.—The Quarterly Returns dated 31st December, 1914, show a large deficiency in aneroid barometers. The shortage below the establishment at the Dockyards was 118. The stock in hand at the Meteorological Office was only 27; 159 were being repaired or on order. In view of the difficulty experienced by the contractors in obtaining satisfactory metal for aneroid boxes, the condition requiring all aneroids to pass the "creep" test at the National Physical Laboratory has been temporarily suspended with the concurrence of the Admiralty. Supplies issued since 1st January include 58 aneroids and 31 mercury barometers.

Instruments have been sent to the agents at Cardiff, Hull and South Shields and Liverpool, and issued directly from the Office to six ships.

Two cones have been supplied to storm warning stations and sundry articles to four telegraphic stations.

The Aitken dust-counter and an absolute maximum thermometer were issued to Kew Observatory on 5th February, an absolute grass minimum was sent on 19th February.

The number of private requisitions for instruments for home stations is 24. Three small consigments have been sent to Crown Colonies.

Instruments under three requisitions were despatched to South Africa on 23rd January. These included a Callendar thermograph, an Angström pyrheliometer, a Dines pressure-tube anemograph, two large Fortin barometers and two sets of earth thermometers of special design.

A millibar barometer and a millimetre raingauge glass have been lent to the Climatological station at Cambridge to replace the corresponding instruments graduated in British units.

The following rules concerning temporary loans of instruments to observers have been approved by order:—

1. A limited number of instruments are available at the Meteorological Office for temporary loans to observers in connexion with the Office, whose own instruments are being tested or repaired.
2. All expenses incurred in sending and returning such an instrument, including any necessary charge for insurance, must be paid by the observer who must also accept the risk of the breakage of the instrument both in transit, if not otherwise provided against, and during the time that it is in his possession. A formal invoice, stating its estimated value, will be sent out with the instrument.
3. Instruments belonging to observers are examined at the Meteorological Office free of charge. If the observer wishes, they can be sent after examination to an instrument maker for repair or alteration, or to the National Physical Laboratory for verification.
4. Arrangements for the supply of new instruments are set out in M.O. Circular 301.

A thermograph and two ordinary thermometers have been installed in the Imperial Institute Tower. Observations are being taken by the Anti-aircraft Observation Company.

Observations with Dr. Owens's air-filter were made at 10h. on 20 days in January and 16 days in February. Observations were made at other times on four days.

The bottles containing the liquid collected in the sootgauge in December and in January were sent to the Director of the Lancet Laboratory.

By consent of the Director of the British Museum (Natural History), observers are now given access to the instruments in the Museum Grounds twice a day, and the instruments are read at 9 a.m. and 6 p.m. The work of the Corps of Observers has been rearranged accordingly. The thermometers used in the screens on the Meteorological Office roof and in the Museum grounds have been compared with new thermometers with National Physical Laboratory certificates, and a list of corrections has been issued.

Observatories.—Kew (January).—The barograph, thermograph and anemograph (Robinson cup) curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office. The pressure tube curves have also been examined and reported on.

The following absolute observations have been made:—

Magnetic	Declination	5	
	Inclination	4	
	Horizontal Force	4	
Potential Gradient on		16	days
Wilson Apparatus on		8	„
Ebert Apparatus on		8	„
Pyrheliometer on		4	„

International cloud observations were made on 3 days.

Scale value determinations have been made of the magnetographs (Horizontal Force and Vertical Force), seismograph and electrograph.

The annual test of thermometers was carried out.

Alterations were made on 31st December of the light stops of the barograph and thermograph, to permit of readings being taken exactly at the hours both even and odd.

The small tree to the north of the thermograph screen was cut down on 31st December.

A paper by the Superintendent, discussing the diurnal variation of atmospheric electricity potential gradient from 1898 to 1912, has been read before the Royal Society and accepted for publication in the Philosophical Transactions.

The test of two dip circles, each with 8 needles, has been completed, and a commencement has been made of the verification of a unifilar magnetometer belonging to Hong Kong Observatory.

The index of the reserve portable electrometer has been broken and the instrument sent for repairs to the makers.

An auxiliary gas stove has been fitted in the Library because the temperature was too low in cold weather, pending the laying of a new gas main by the Richmond Gas Company.

(February).—The barograph, thermograph and anemograph curves have been tabulated as usual, and the ordinary meteorological data have been sent weekly to the Office.

The following absolute observations have been made :—

Magnetic	Declination	5	
	Inclination	5	
	Horizontal Force	5	
Potential Gradient on		20	days
Wilson Apparatus on		13	„
Ebert Apparatus on		13	„
Pyrheliometer on		7	„

International cloud observations were made on 6 days.

Two scale determinations were made of the electrograph.

A comparison was made of the records from the Kelvin and Benndorff electrographs for several complete fine days, and the results—which were sent to the Director—showed a satisfactorily close agreement between the two instruments in their different sites.

A comparison was made of the "New" large standard barometer and the working standard Newman 34.

Photographic copies were made of a number of Kew declination curves at the request of Mr. Foster Brown and supplied to him.

The verification of the Hong Kong magnetometer No. 83 has progressed. The two inertia bars supplied with it and others belonging to Kew Observatory have been swung in Dr. Watson's apparatus. Further experiments are in contemplation.

Traces of rust have been observed in several of the Observatory magnets and Mr. Dover has been consulted on the subject.

The old pressure tube anemometer No. 147 has been dismounted and sent to Mr. Munro.

On 25th February Mr. Stewart left to undertake temporary duty at Falmouth Observatory.

Eskdale (January).—Staff.—The Superintendent has been on leave since January 10th. David Black returned to Lockerbie on January 9th. A few days leave have been taken by other members of the staff, and there has been some absence due to illness.

On January 15th a notice from the Chief Constable of Dumfries was brought to the Observatory through the medium of P.C. Beck of Eskdalemuir. This was to the effect that Colonel Paterson, commanding the Southern District, desired a look-out to be kept for aircraft by any who were in a position to do so during the three nights January 16th, 17th and 18th. The Observatory staff did so between them ; there was nothing to report.

The Underground Magnet House.—154 litres of water have been removed from December 30th to January 27th.

The temperature continues to be about 1·7° higher than at the corresponding period last year.

Magnetism.—The changes made in the N. and W. magnetographs at the beginning of the month have been fully reported previously. The instruments have been working satisfactorily since that time.

The tabulations are in the following state :—

——	N.	W.	V.
Read once	To date	To date	To date.
„ twice	„	January 8th	„
Converted to γ and checked	Same as last month.		
Monthly sheets finished	End of March	End of March	End of April.
Quiet days	„ „	„ „	„ March.
Log $(1 + P/r^2 + Q/r^4)$	End of August, 1914.		

Five observations have been made of Declination and Horizontal force, and four of dip by the inductor.

Mr. Skelton has been taking regular observations with the magnetometer and inductor for the sake of practice, and will soon be able to take observations for base value purposes if required.

Meteorology.—The usual observations and tabulations have been continued. The thermograms are now read in absolute units. There have been very few opportunities for pilot balloon ascents or solar radiation observations.

Mr. Skelton has made six observations with the Kata thermometer lent by Dr. Hill.

An electrical hour marker is being installed on the float barograph ; the necessary wiring has been done by Mr. Stonier, and it is hoped ultimately to instal accurate time marking from the same circuit to some of the other indoor instruments.

A separate vessel has been placed under the overflow of the Beckley gauge and the water collected measured daily. The results have shown that there is a systematic difference between the depth of rain collected in the Beckley and that collected in the adjoining protected gauge. The reason is at present unknown.

Atmospheric Electricity.—Six observations have been made with the Ebert apparatus.

The tabulations are in the following state :—Curves read to date. Monthly sheets for 1914 practically finished.

Seismology.—After consultation with the Director a Monthly bulletin of seismological events has been started as a temporary measure, to be issued about the middle of the following month.

The December 1914 bulletin has been prepared and some half dozen copies distributed.

Some three months tabulations in 1914 remain to be done.

Miscellaneous.—Mr. Laidlaw has lately been engaged in making a drying rack in the chemical laboratory, also a special table with a glass top to facilate curve reading.

(February).—Staff.—Mr. L. Dines has been on leave since February 24th (to be married on 26th February). The Superintendent took up duty again on February 4th.

Grounds.—Mr. Laidlaw reports that, of the 5,000 young trees under his care, only 5 have died, while 40 have been nibbled by hares during this winter.

He has re-levelled the lawn around the electrograph pit.

Buildings.—The Office of Works have kindly arranged for half a dozen slate shelves to be cemented into the walls inside the laboratories, to serve as supports for mirror instruments.

255 litres of water have been removed from the trench in the magnet house since January 27th. In spite of this large inflow the rooms are much drier than they were in the Autumn, when condensation was taking place from the incoming air. The vessels of calcium chloride will now be removed from the corridor and concentrated in the inner rooms. During the past five months more water has been collected in the east than in the west room.

The temperature in the east room continues to be 1°·6 C. higher than on the same date last year.

The Office of Works have forwarded a copy of a report upon the mouldy wood from the magnet house corridor.

Royal Botanic Garden, Edinburgh.

Second Report on Samples of Wood from Eskdalemuir Observatory.

The samples of wood have been kept under conditions favourable for the development of dry rot for about two months.

None of the dry rot fungus has appeared on them. It may be concluded that the dry rot fungus is not present in a living condition.

(Signed) Malcolm Wilson.

2nd February, 1915.

Magnetics.—Seven observations have been made of declination, six of horizontal force, and five of dip by inductor. The galvanometer of the inductor has been very troublesome, but is now in good order. The tabulations are in the following state :—

——	N.	W.	V.
Read twice	To date ...	To date ...	To date.
Converted to γ and checked	September ...	September ...	September.
Monthly sheets finished	June	June	June.
Quiet days finished	June	June	June.
Final base value		August 31st.	
Log $(1 + P/r^2 + Q/r^4)$...		October 31st.	

The state of this computing compares favourably with that on the same date last year. The tabulation is carried out mainly by Mr. Harris and Mr. Beck with some help from Mr. Dines and Mr. Skelton.

Every part is worked by one person and checked by another. In order to secure uniform treatment of detail it has been arranged that Mr. Harris either works or checks all of it.

Scale tests in January and February have given the values at 4·98, 5·00, and 4·99 γ/mm. for the north magnetograph in good agreement with the 5·00 aimed at.

The Superintendent has been occupied with computing the international comparison made in 1913.

Mr. Stonier is making for Kew an instrument for testing brass designed by the Superintendent.

Meteorology.—Six observations have been made of solar radiation, four with the Kata thermometer and two of pilot balloons. By February 22nd it was light enough to observe a balloon at 7h. 15m. a.m., and Mr. Stonier and another observer (who goes by rotation) are now on duty every day at 7 a.m.

The time marker which was fitted to the float barograph is working nicely.

Atmospheric Electricity.—Six observations of + and − charge have been made with the Ebert apparatus.

Seismology.—Two type-written monthly bulletins have been issued. A correspondence has been continued with Mr. J. J. Shaw relating to his new seismograph. Progress has been made with a paper by Messrs. Richardson and Dines on the real motion of the ground.

Post Office.—A report has been sent to the Director upon the visit of a Post Office surveyor.

The Inventory has been copied, but some prices have yet to be assigned.

Benson (October–December).—The work of the station was somewhat restricted owing to the war. Firstly because the local police objected to kite flying, apparently because they seemed to think that a person using a steel wire for a kite would be unable to resist the temptation of putting a receiving instrument for wireless telegraphy at the end, secondly, because it has become very difficult to obtain rubber balloons.

It is probable that very little kite flying would have been done in any case, but the want of balloons has hampered the balloon ascents, which have had to be confined to the international days and also prevented ascents from Eskdalemuir.

The time which would otherwise have been occupied in making meteorographs has been employed in fitting up a proper meteorological station, and all the usual self-recording instruments of a first order station, except a sunshine recorder, are now in use.

Mr. Newnham, who came in October to study the upper air work, has been engaged in tabulating the figures published by the International Committee and has now nearly completed an interesting report on the subject.

Accounts.—Submitted—The following statement of the Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on 26th January, 1915	5,603	4	6
Receipts from 27th January to 23rd March	535	2	11
	6,138	7	5
Cheques drawn from 27th January to 23rd March	3,837	2	2
Balance on 23rd March, 1915	£2,301	5	3